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(54) **OPTICAL DISK, RECORDING AND REPRODUCING METHOD FOR ADDITIONAL INFORMATION IN OPTICAL DISK, AND REPRODUCING DEVICE AND RECORDING DEVICE FOR OPTICAL DISK**

(57)Abstract:
PROBLEM TO BE SOLVED: To protect the copyright of contents severely and to prevent software from illegally being used as to an optical disk.
SOLUTION: The optical disk has a recording area where additional information is recorded and the information is recorded as data on stripes. This recording area has ciphered additional information 112 which is inhibited from being outputted from the recording and reproducing device and control data 11 showing whether or not there is information inhibited from being outputted in the additional information. The

reproducing device for an optical disk like that never outputs the output-inhibited information to the outside.

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CLAIMS

[Claim(s)]
[Claim 1] It is the optical disk equipped with the recording layer which records information on a disk substrate. A recording layer The 1st record section which recorded the data for contents data and its record playback, It has the 2nd record section which records degree data. it is related with the contents recorded on the 1st record section -- secondary -- the 2nd record section The 1st partition on which CDC about the 2nd record section is recorded, The 2nd partition on which the data to which it is not prohibited from being outputted outside from the record regenerative apparatus of an optical disk are recorded, It is prepared when the output prohibition data to which it should be prohibited from being outputted outside from the record regenerative apparatus of an optical disk are recorded. CDC which consists of the 3rd partition on which output prohibition data are recorded, and is recorded on the 1st partition is an optical disk including the recognition signal which shows whether the 2nd record section includes the 3rd partition.
[Claim 2] the 2nd aforementioned record section -- secondary -- the optical disk according to claim 1 characterized by being the field which cannot be rewritten once it records degree data as a mark of a long stripe configuration radially and writes them in.
[Claim 3] The optical disk according to claim 1 or 2 currently recorded in the data for record playback of the 1st record section of the above [the identifier which shows whether information is recorded on the 2nd record section].
[Claim 4] The optical disk according to claim 1 or 2 with which the identifier which

shows whether information is recorded on the 2nd record section is recorded on the 1st partition of the 2nd aforementioned record section.
[Claim 5] The optical disk according to claim 1 or 2 currently recorded in the data for record playback of the 1st record section of the above [the identifier which shows whether data are added and recorded on the 2nd record section, and the data storage capacity currently recorded on the 2nd record section].
[Claim 6] An optical disk given in any 1 term of claims 1-5 by which the enciphered data are recorded on the 3rd partition of the 2nd aforementioned record section.
[Claim 7] An optical disk given in any 1 term of claims 1-6 by which a different disk ID at least for every disk is recorded on the 2nd aforementioned record section.
[Claim 8] An optical disk given in any 1 term of claims 1-7 by which the 2nd aforementioned record section is established in the specific section of the disk inner circumference section or the disk periphery section.
[Claim 9] The optical disk according to claim 1 with which data are recorded on the 1st record section, and data are recorded on the 2nd record section by the disk radial as a mark of a long stripe configuration by removing said reflective film selectively by preparing a concavo-convex bit in the reflective film in said recording layer.
[Claim 10] The optical disk indicated [that the 1st aforementioned record section includes the field which can rewrite informational, and] by any 1 term of claims 1-9 which carry out the description.
[Claim 11] The aforementioned recording layer is an optical disk according to claim 10 characterized by the ability of the 1st aforementioned record section to record with an optical means.
[Claim 12] The aforementioned recording layer is an optical disk according to claim 10 to which the 1st aforementioned record section is characterized by record and elimination of multiple times being possible with an optical means.
[Claim 13] The optical disk according to claim 10, 11, or 12 characterized by the aforementioned recording layer consisting of an organic material which changes between two detectable conditions optically at least.
[Claim 14] The optical disk according to claim 12 characterized by the aforementioned recording layer consisting of a magnetic film which has a magnetic anisotropy to a film surface perpendicular direction at least.
[Claim 15] The stripe section of said 2nd record section is an optical disk according to claim 14 characterized by the magnetic anisotropy of a film surface perpendicular direction being smaller than the part between the stripe sections.
[Claim 16] The optical disk according to claim 12 with which the aforementioned recording layer consists of two or more magnetic films by which the laminating was carried out.
[Claim 17] The optical disk according to claim 10 characterized by for the aforementioned recording layer consisting of a thin film which may change between two detectable conditions reversibly optically, and the amount of reflected lights from said 1st record section differing from the amount of reflected lights from said 2nd record section.
[Claim 18] The optical disk according to claim 17 characterized by the aforementioned recording layer carrying out a phase change reversibly between a crystal phase and an amorphous phase corresponding to the exposure conditions of the light irradiated.
[Claim 19] The optical disk according to claim 17 characterized by the aforementioned

recording layer consisting of a germanium-Sb-Te alloy.
[Claim 20] The 2nd record section is an optical disk according to claim 18 characterized by consisting of a part between the stripe section which consists of an amorphous phase, and the stripe section which consists of a crystal phase.
[Claim 21] The 2nd record section is an optical disk according to claim 17 characterized by consisting of a part between the stripe section and the stripe section with a reflection factor higher than the stripe section.
[Claim 22] It has at least the recording layer which records information on a disk substrate. The aforementioned recording layer The 1st record section which recorded the data for contents data and its record playback, It is the playback approach of the optical disk which reproduces contents from an optical disk equipped with the 2nd record section which records degree data as a mark of a long stripe configuration radially. it is related with the contents recorded on the 1st record section -- secondary -- Before reproducing contents from the 1st record section of an optical disk, data are reproduced from the 2nd record section. From CDC contained in the data reproduced from the 2nd record section It judges whether the data reproduced from the 2nd record section contain the data to which it should be prohibited from being outputted out of the record regenerative apparatus of an optical disk. The data concerned with which an output should be forbidden when judging that the data reproduced from the 2nd record section contain the data with which an output should be forbidden are the playback approach of the optical disk processed only inside the record regenerative apparatus which is playing the optical disk.
[Claim 23] The playback approach of the optical disk according to claim 22 which reproduces information from the 1st record section according to the playback conditions in the data with which an output should be forbidden when judging that the data reproduced from the 2nd record section contain the data with which an output should be forbidden.
[Claim 24] The playback approach of the optical disk according to claim 22 which reproduces the data for record playback in the 1st record section, and reproduces the aforementioned data from the 2nd record section only when the identifier which shows the existence of the data in the 2nd record section is detected and this identifier is detected from the data for the reproduced record playback.
[Claim 25] When it is judged that the data reproduced from the 2nd record section contain the data with which an output should be forbidden, Only when the limit about playback of the data which performed reference using the data reproduced from the 2nd record section, and were recorded on the 1st record section is canceled by reference The playback approach of an optical disk given in any 1 term of claims 22, 23, and 24 which perform playback by the decode and the decryption of the regenerative signal of data which were recorded on the 1st record section.
[Claim 26] The playback approach of an optical disk given in any 1 term of claims 22, 23, and 24 which produce an information signal based on the data with which an output should be forbidden, and superimpose and output the aforementioned production information signal to the aforementioned contents data when judging that the data reproduced from the 2nd record section contain the data with which an output should be forbidden.
[Claim 27] It has at least the recording layer which records information on a disk

substrate. The aforementioned recording layer The 1st record section which recorded the data for contents data and its record playback, It is the regenerative apparatus of the optical disk which reproduces contents from an optical disk equipped with the 2nd record section which records degree data as a mark of a long stripe configuration radially. it is related with the contents recorded on the 1st record section -- secondary -- The optical head which reproduces information from an optical disk by the optical spot, and the 1st playback section which reproduces the data of the 1st record section using an optical head, It is the regenerative apparatus of the optical disk with which it has the 2nd playback section which reproduces the data of the 2nd record section using an optical head, and the 2nd playback section processes the data with which the output in a regenerative signal should be forbidden only inside when the data with which an output should be forbidden to the 2nd record section are recorded.

[Claim 28] furthermore, when a detection means to detect the identifier of whether information is recorded on the 2nd record section of an optical disk from the regenerative signal of the 1st playback section, and a detection means detect said identifier The regenerative apparatus of an optical disk [equipped with the control means which judges whether the data with which an optical head is moved to the 2nd record section, CDC is reproduced from the 2nd record section with the 2nd playback means, and an output should be forbidden from CDC are included] according to claim 27.

[Claim 29] Said detection means is the regenerative apparatus of the optical disk according to claim 28 which detects said identifier based on the sum signal of the detecting signal from the detection light which received light by the detecting signal or two or more photo detectors from the detection light which received light by one photo detector of an optical head.

[Claim 30] It has a detection means to detect the existence of setting out of the protected mode to the data memorized in the 1st record section from the data recorded on said 2nd record section. Furthermore, said 1st playback section When it is detected that said protected mode is set up by said detection means Only when reference using the data recorded on the 2nd record section is performed and the limit about playback of the 1st record section is canceled by reference The regenerative apparatus of an optical disk given in any 1 term of claims 27, 28, and 29 which perform playback by decode and a decryption of the contents data from the 1st record section.

[Claim 31] Claims 27, 28, and 29 characterized by the output prohibition data in the 2nd record section containing a different disk ID for every optical disk, the regenerative apparatus of the optical disk of 30 given in any 1 term.

[Claim 32] Claims 27, 28, and 29 which the disk ID contained in the 2nd record section is enciphered, and have a key production means to produce the private key which decrypts the contents data of the 1st record section using the enciphered disk ID which is contained in the 2nd record section, further, the regenerative apparatus of the optical disk of 30 given in any 1 term.

[Claim 33] The 2nd playback section is the regenerative apparatus of the optical disk according to claim 32 characterized by performing reference, or decode and a decryption of the 1st record section of contents data using the private key produced by the aforementioned key production means.

[Claim 34] The 3rd playback section which encryption data are recorded on the 2nd record section of an optical disk, and decodes further the encryption data reproduced by

the 2nd playback section, It has the code decoder of the signal reproduced from the 1st record section, and the 3rd playback section, the 1st which are prepared for the both sides of a code decoder and the 2nd mutual recognition section. The regenerative apparatus of an optical disk given in any 1 term of claims 27, 28, 29, and 30 which cancel the code of the 1st record section only when the 1st and 2nd mutual recognition section attests each other.

[Claim 35] The 2nd playback section is the regenerative apparatus of an optical disk given in any 1 term of claims 27, 28, 29, and 30 which reproduced the encryption data with which the output from the regenerative apparatus of an optical disk should be forbidden from the 2nd record section, and were equipped with a transmitting means to send said encryption data and the playback data from the 2nd record section of a plaintext to an external processing unit through a path cord further.

[Claim 36] It has the recording layer which records information on a disk substrate. The aforementioned recording layer The 1st record section which recorded the data for contents data and its record playback, It is the regenerative apparatus which reproduces contents from an optical disk equipped with the 2nd record section which records degree data as a mark of a long stripe configuration radially. it is related with the contents recorded on the 1st record section -- secondary -- The optical head which reproduces data from an optical disk by the optical spot, and the 1st signal regeneration section which reproduces data from the 1st record section using an optical head, It consists of the 2nd signal regeneration section which reproduces data from the 2nd record section using an optical head. Said 2nd signal regeneration section It is the regenerative apparatus of the optical disk characterized by producing an information signal based on the data with which the output from the record regenerative apparatus contained in playback data should be forbidden, and for the 1st signal regeneration section superimposing said information signal produced by the 2nd signal regeneration section by the signal reproduced from the 1st record section, and outputting.

[Claim 37] Furthermore, the 3rd playback section which reproduces the superposition signal created using the data with which the output from the record regenerative apparatus of an optical disk should be forbidden, It has the code decoder of the signal reproduced from the 1st record section, and the 3rd playback section, the 1st which are prepared for the both sides of a code decoder and the 2nd mutual recognition section. The regenerative apparatus of the optical disk according to claim 36 of which the code of the 1st record section is canceled only when the 1st and 2nd mutual recognition section attests each other.

[Claim 38] The regenerative apparatus of the optical disk [equipped with a transmitting means to send a means to reproduce at least the encryption data with which the output from the regenerative apparatus of an optical disk should be forbidden from the 2nd record section, said encryption data, and the playback data from the 2nd record section of a plaintext to an external processing unit through a path cord] according to claim 36.

[Claim 39] It has at least the recording layer which records information on a disk substrate. The aforementioned recording layer The 1st record section which recorded the data for contents data and its record playback, It is the record regenerative apparatus which performs record playback of contents from an optical disk equipped with the 2nd record section which records degree data as a mark of a long stripe configuration radially. it is related with the contents recorded on the 1st record section -- secondary -- A

production means to produce an information signal based on data including the information on a disk proper recorded on the 2nd record section that the output from said record regenerative apparatus should be forbidden, The record regenerative apparatus of the optical disk equipped with a means to record said produced information signal on the 1st record section as a signal superimposed on the specific signal, or to add it to the 2nd record section.

[Claim 40] The aforementioned superposition signal is the record regenerative apparatus of the optical disk according to claim 39 which is the watermark produced using the disk ID recorded on the 2nd record section.

[Claim 41] It has the watermark adjunct which adds a watermark to the contents data recorded on the 2nd record section. Furthermore, said watermark adjunct The data recorded on said 2nd record section are reproduced by the optical head. The record regenerative apparatus of the optical disk according to claim 40 characterized by adding the information signal produced based on the reproduced data to said contents data as a watermark, and recording said data containing a watermark on the 1st record section.

[Claim 42] Furthermore, a frequency-conversion means to change the regenerative signal from the 1st record section into a frequency shaft signal from a time-axis signal, and to create the 1st conversion signal, The record regenerative apparatus of the optical disk [equipped with a means to create the mixed signal which added or superimposed the signal reproduced from the 2nd record section on said 1st conversion signal, and a reverse frequency conversion means to change said mixed signal into a time-axis signal from a frequency shaft signal, and to create the 2nd conversion signal] according to claim 41.

[Claim 43] It has at least the recording layer which records information on a disk substrate. Said recording layer it is related with the contents recorded on the 1st record section for record playback of contents data -- secondary -- it is the recording device which records contents on an optical disk equipped with the 2nd record section which can record degree data as a mark of a long stripe configuration radially, and was recorded on the 2nd record section -- The recording device of the optical disk equipped with an encryption means to encipher contents based on the data which include the information on a proper in each optical disk, and a record means to record the enciphered contents data on the 1st record section.

[Claim 44] Furthermore, said record means is an optical disk recording device according to claim 43 characterized by recording the signal which enciphered said input signal on an optical disk based on [when the playback result which was equipped with a watermark recovery means to reproduce the watermark information produced using Disk ID from the input signal, and was reproduced with the watermark playback means shows a specific value] said disk ID.

[Claim 45] Said watermark recovery means is an optical disk recording device according to claim 44 characterized by restoring to a watermark using the signal which changed the input signal into frequency space from time-axis space.

[Claim 46] It has at least the recording layer which records information on a disk substrate. The aforementioned recording layer The 1st record section which recorded the data for contents data and its record playback, It has the 2nd record section which records degree data as a mark of a long stripe configuration radially. it is related with the contents recorded on the 1st record section -- secondary -- It is the regenerative apparatus which

reproduces contents from the optical disk with which the disk ID of a disk proper is contained in degree data. contents data are enciphered and recorded -- having -- **** -- secondary -- The optical head which reproduces data from an optical disk by the optical spot, and the 1st signal regeneration section which reproduces contents data from the 1st record section using an optical head, an optical head -- using -- from the 2nd record section -- secondary -- the optical disk regenerative apparatus with which it consists of the 2nd signal regeneration section which reproduces degree data, and the 1st signal regeneration section is equipped with the code decoder which decodes the code of contents data using the disk ID played by the 2nd signal regeneration section.

[Claim 47] Said 2nd signal regeneration section is an optical disk regenerative apparatus according to claim 46 characterized by having a PE_RZ recovery means.

[Claim 48] after said 2nd signal regeneration section oppresses a high-frequency component for the signal with which the cut off frequency reproduced the high region frequency component oppression means 1.2MHz or more from owner ** and the 2nd record section with said high region frequency component oppression means -- secondary -- the optical disk regenerative apparatus according to claim 46 characterized by restoring to degree data.

[Claim 49] It has the recording layer which records information on a disk substrate. Said recording layer The 1st record section which recorded the data for contents data and its record playback, It is the regenerative apparatus which plays an optical disk equipped with the 2nd record section which records degree data as a mark of a long stripe configuration radially. it is related with the contents recorded on the 1st record section -- secondary -- It has the 2nd signal regeneration section which reproduces degree data. from the 1st signal regeneration section which reproduces contents data from the 1st record section, and the 2nd record section -- secondary -- said 2nd signal regeneration section after oppressing a high-frequency component for the signal which a cut off frequency has a high region frequency component oppression means 1.2MHz or more, and reproduced from the 2nd record section with said high region frequency component oppression means -- secondary -- the optical disk regenerative apparatus which restores to degree data.

[Claim 50] Said subplayback means is an optical disk regenerative apparatus according to claim 49 characterized by having a PE_RZ recovery means.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the information record medium, its record playback approach, and record regenerative apparatus of the optical disk and others in which informational record, playback, and elimination are possible.

[0002]

[Description of the Prior Art] In recent years, with digitization of the rapid increment in the amount of information processing by development of a computer or information processing system, and an information processing rate, and sound information and image

information, it is large capacity in a low price, and, moreover, the auxiliary storage unit in which rapid access is possible and its record medium, especially an optical disk have spread quickly.

[0003] The basic configuration of the conventional magneto-optic disk is as follows. That is, on the disk substrate, the recording layer is formed through the dielectric layer. On the recording layer, sequential formation of a medium dielectric layer and the reflecting layer is carried out, and the exaggerated coat layer is further formed on it. Informational record and informational elimination raise the temperature of a recording layer by the exposure of a laser beam, and change magnetization, and playback of a record signal irradiates a laser beam at a recording layer, and it is carried out by detecting the rotatory polarization based on the magneto-optical effect as luminous-intensity change.

[0004] Moreover, in the case of optical disks, such as DVD-ROM, DVD-RAM, and DVD-R, it is formed as two optically different conditions of the recording layer which information becomes from a pit, or the concavo-convex phase change ingredient and concavo-convex organic material of a substrate. Furthermore, a reflecting layer and an overcoat layer are formed on it. An informational regenerative signal is detected as a difference of the amount of reflected lights between two conditions by the existence of the pit when irradiating a laser beam or a structural change, and the chemical change.

[0005]

[Problem(s) to be Solved by the Invention] In this optical disk, protection management of the disk information using postscript information available to protection of copyrights, such as duplicate prevention and unauthorized use prevention of software, is demanded. It is possible to record disk information on the TOC (Table of Contents) field which is a record section of CDC in the above optical disks. However, when disk information was recorded in a pre pit, it became the management for every La Stampa, and there was a trouble that disk information for every user was not manageable.

[0006] Moreover, when recording information using the thin film which consists of a magnetic film or a reversible phase change ingredient, it is possible to perform easily, modification (alteration), i.e., unjust rewriting, of management information. For this reason, there was a trouble that protection management of the copyright of the contents in an optical disk etc. could not be performed.

[0007] Furthermore, also when postscript information was recorded by the irreversible record approach, postscript information was reproduced, and when a record regenerative apparatus to an output was possible, there was a trouble that management of the main information might become imperfection and injustice might be performed by the alteration of the content of postscript information and processing.

[0008] The object of this invention is providing protection of copyrights, such as duplicate prevention and unauthorized use prevention of software, with an available optical disk. Moreover, other objects of this invention are offering the record approach of such an optical disk, and the playback approach. Moreover, the object of further others of this invention is offering the regenerative apparatus of such an optical disk, a recording device, and a record regenerative apparatus.

[0009]

[Means for Solving the Problem] the optical disk concerning this invention is an optical disk equipped with the recording layer which records information on a disk substrate, and a recording layer is related with the contents recorded on the 1st record section which

recorded the data for contents data and its record playback, and the 1st record section -- secondary -- it has the 2nd record section which records degree data as a mark of a long stripe configuration radially. The 2nd record section is prepared when the output prohibition data to which it should be prohibited from being outputted outside from the 2nd partition on which the 1st partition on which CDC about the 2nd record section is recorded, and the data to which it is not prohibited from being outputted outside from the record regenerative apparatus of an optical disk are recorded, and the record regenerative apparatus of an optical disk are recorded, and it becomes from the 3rd partition on which output prohibition data are recorded. CDC recorded on the 1st partition includes the recognition signal which shows whether the 2nd record section includes the 3rd partition. The data recorded on the 2nd record section are recorded for example, on a disk circumferencial direction as an arranged mark train. According to this optical disk, data available to protection of copyrights, such as duplicate prevention and unauthorized use prevention of software, are recordable on the 2nd record section.

[0010] Preferably, in the aforementioned optical disk, the 2nd record section is a field which cannot be rewritten once it writes in data. Therefore, if a content provider etc. writes in data, a user cannot rewrite. The identifier which shows preferably whether information is recorded on the 2nd record section in the aforementioned optical disk is recorded in the data for record playback of the 1st record section. Thereby, an optical disk can be started in a short time.

[0011] The identifier which shows preferably whether information is recorded on the 2nd record section in the aforementioned optical disk is recorded on the 1st partition of the 2nd aforementioned record section. Thereby, when the data of the 1st partition are reproduced, it can judge certainly whether the data of the 3rd partition can be outputted. It is recorded in the data for record playback of the 1st record section of the above [the identifier which shows preferably whether data are added and recorded on the 2nd record section in the aforementioned optical disk, and the data storage capacity currently recorded on the 2nd record section]. Thereby, unjust modification of the data of the 2nd record section can be prevented.

[0012] Preferably, the enciphered data are recorded on the 3rd partition of the 2nd aforementioned record section. Thereby, the unauthorized use of the data of the 3rd partition is made more into difficulty.

[0013] Preferably, a different disk ID at least for every disk is recorded on the 2nd aforementioned record section. If this records correlation with Disk ID and encryption information on the 2nd record section as a disk ID against an output in the condition of having completely lost, it will become impossible to guess by the operation from Disk ID. For this reason, an illegal copy contractor can prevent publishing new ID unjustly.

[0014] Preferably, in the aforementioned optical disk, the 2nd record section is established in the specific section of the disk inner circumference section or the disk periphery section. Thereby, when accessing the 2nd record section, an optical head can be moved radially in a short time. Preferably, in the aforementioned optical disk, the 1st record section includes the field which can rewrite informational. Therefore, a user can do record and playback of data in the 1st record section.

[0015] Preferably, in the aforementioned optical disk, the 1st record section can record the aforementioned recording layer with an optical means. Moreover, the aforementioned recording layer has record and elimination of multiple times possible for the 1st record

section by the optical means preferably. Moreover, the aforementioned recording layer consists of an organic material which changes between two detectable conditions optically at least preferably.
[0016] Preferably, the aforementioned recording layer consists of a magnetic film which has a magnetic anisotropy to a film surface perpendicular direction at least in the aforementioned optical disk. Moreover, the stripe section of the 2nd record section has the magnetic anisotropy of a film surface perpendicular direction smaller than the part between the stripe sections preferably. Thereby, by changing the sense of magnetization of the recording layer of an optical disk selectively, the repeat record playback to a recording layer is possible, and the regenerative signal of postscript information can be acquired using the optical head of the same configuration.
[0017] Preferably, the aforementioned recording layer consists of two or more magnetic films by which the laminating was carried out in the aforementioned optical disk. Thereby, if a magnetic super resolution method is used as a playback system, it will become reproducible [the signal in a field smaller than a laser beam spot].
[0018] In the aforementioned optical disk, the aforementioned recording layer consists of a thin film which may change between two detectable conditions reversibly optically preferably, and the amount of reflected lights from said 1st record section differs from the amount of reflected lights from said 2nd record section. Preferably, corresponding to the exposure conditions of the light irradiated, the phase change of the aforementioned recording layer is reversibly carried out between a crystal phase and an amorphous phase. Moreover, the aforementioned recording layer consists of a germanium-Sb-Te alloy preferably.
[0019] For example, the 2nd record section consists of a part between the stripe section which consists of an amorphous phase, and the stripe section which consists of a crystal phase. Moreover, for example, the 2nd record section consists of a part between the stripe section and the stripe section with a reflection factor higher than the stripe section.
[0020] Preferably, by preparing a concavo-convex bit in the reflective film in a recording layer in the aforementioned optical disk, data are recorded on the 1st record section and data are recorded on the 2nd record section by the disk radial as a mark of a long stripe configuration by removing said reflective film selectively.
[0021] Moreover, the playback approach of the optical disk concerning this invention It has at least the recording layer which records information on a disk substrate. The aforementioned recording layer The 1st record section which recorded the data for contents data and its record playback, it is related with the contents recorded on the 1st record section -- secondary -- it is the playback approach of the optical disk which reproduces contents from an optical disk equipped with the 2nd record section which records degree data as a mark of a long stripe configuration radially. Before reproducing contents from the 1st record section of an optical disk in this playback approach, it judges whether the data reproduced from the 2nd record section contain the data to which it should be prohibited from being outputted out of the record regenerative apparatus of an optical disk from CDC contained in the data which reproduced data from the 2nd record section and were reproduced from the 2nd record section. When judging that the data reproduced from the 2nd record section contain the data with which an output should be forbidden, the data concerned with which an output should be forbidden are processed only inside the record regenerative apparatus which is playing the optical disk, therefore

are not outputted outside. It cannot perform easily carrying out the playback output of the data with which an output should be forbidden by this, and it cannot alter the content of the data.

[0022] When judging that the data reproduced from the 2nd record section contain preferably the data with which an output should be forbidden in the aforementioned playback approach, information from the 1st record section is reproduced according to the playback conditions in the data with which an output should be forbidden.

[0023] Preferably, in the aforementioned playback approach, the data for record playback are reproduced in the 1st record section, and only when the identifier which shows the existence of the data in the 2nd record section is detected and this identifier is detected from the data for the reproduced record playback, the aforementioned data from the 2nd record section are reproduced.

[0024] When it is judged that the data reproduced from the 2nd record section contain preferably the data with which an output should be forbidden in the aforementioned playback approach, Reference using the data reproduced from the 2nd record section is performed, and only when the limit about playback of the data recorded on the 1st record section is canceled by reference, playback by the decode and the decryption of the regenerative signal of data which were recorded on the 1st record section is performed.

[0025] When judging that the data reproduced from the 2nd record section contain preferably the data with which an output should be forbidden in the aforementioned playback approach, an information signal is produced based on the data with which an output should be forbidden, and the aforementioned production information signal is superimposed and outputted to the aforementioned contents data.

[0026] Moreover, the regenerative apparatus of the optical disk concerning this invention It has at least the recording layer which records information on a disk substrate. The aforementioned recording layer The 1st record section which recorded the data for contents data and its record playback, it is related with the contents recorded on the 1st record section -- secondary -- it is the regenerative apparatus of the optical disk which reproduces contents from an optical disk equipped with the 2nd record section which records degree data as a mark of a long stripe configuration radially. This regenerative apparatus is equipped with the optical head which reproduces information from an optical disk by the optical spot, the 1st playback section which reproduces the data of the 1st record section using an optical head, and the 2nd playback section which reproduces the data of the 2nd record section using an optical head. The 2nd playback section processes the data with which the output in a regenerative signal should be forbidden only inside, when the data with which an output should be forbidden to the 2nd record section are recorded. according to the regenerative apparatus of this optical disk -- the prohibition of an output -- secondary -- degree data are identified easily and it does not output outside.

[0027] Moreover, when a detection means detect the identifier of whether information is preferably recorded on the 2nd record section of an optical disk from the regenerative signal of the 1st playback section, and a detection means detect said identifier, the aforementioned regenerative apparatus moves an optical head to the 2nd record section, reproduces CDC from the 2nd record section with the 2nd playback means, and is equipped with the control means which judges whether the data with which an output should be forbidden are included from CDC.

[0028] Moreover, the aforementioned detection means detects said identifier preferably

based on the sum signal of the detecting signal from the detection light which received light by the detecting signal or two or more photo detectors from the detection light which received light by one photo detector of an optical head. Since the informational stripe and informational defect which were recorded on the 2nd record section can be distinguished easily by this, the build up time of equipment can be shortened. Moreover, compatibility can be given to informational playback even if it is the optical disk of a different playback system.

[0029] Moreover, the aforementioned regenerative apparatus has preferably a detection means to detect the existence of setting out of the protected mode to the data memorized in the 1st record section, further from the data recorded on said 2nd record section. The 1st playback section performs playback by decode and a decryption of the contents data from the 1st record section, only when reference using the data recorded on the 2nd record section when it was detected that protected mode is set up by the detection means is performed and the limit about playback of the 1st record section is canceled by reference. Thereby, protection and access privilege of management information, such as an individual and an enterprise, are strengthened dramatically. Therefore, information, such as a data file, can be protected, such as preventing informational unjust runoff.

[0030] Moreover, in the aforementioned regenerative apparatus, the output prohibition data in the 2nd record section contain a different disk ID for every optical disk preferably. Therefore, reference is performed using a different disk ID for every optical disk.

[0031] Moreover, the aforementioned regenerative apparatus has a key production means to produce the private key which decrypts the contents data of the 1st record section further using the enciphered disk ID, preferably. Moreover, preferably, the 2nd playback section performs reference using the private key produced by the key production means, or performs decode and a decryption of the 1st record section of contents data.

[0032] Encryption data are recorded on the 2nd record section of an optical disk. Moreover, preferably The 3rd playback section in which the aforementioned regenerative apparatus decodes further the encryption data reproduced by the 2nd playback section, It has the code decoder of the signal reproduced from the 1st record section, and the 3rd playback section, the 1st which are prepared for the both sides of a code decoder and the 2nd mutual recognition section, and only when the 1st and 2nd mutual recognition section attests each other, the code of the 1st record section is canceled. A code is canceled, only when this reproduces the enciphered main information and it attests each other.

[0033] Moreover, preferably, the 2nd playback section reproduces the encryption data with which the output from the regenerative apparatus of an optical disk should be forbidden from the 2nd record section, and is further equipped with a transmitting means to send said encryption data and the playback data from the 2nd record section of a plaintext to an external processing unit through a path cord.

[0034] moreover, the regenerative apparatus of the 2nd optical disk concerning this invention is equipped with the recording layer which records information on a disk substrate, and the aforementioned recording layer is related with the contents recorded on the 1st record section which recorded the data for contents data and its record playback, and the 1st record section -- secondary -- it is the regenerative apparatus which reproduces contents from an optical disk equipped with the 2nd record section which records degree data as a mark of a long stripe configuration radially. This regenerative

apparatus consists of the optical head which reproduces data from an optical disk by the optical spot, the 1st signal regeneration section which reproduces data from the 1st record section using an optical head, and the 2nd signal regeneration section which reproduces data from the 2nd record section using an optical head. The 2nd signal regeneration section produces an information signal based on the data with which the output from the record regenerative apparatus contained in playback data should be forbidden, and the 1st signal regeneration section superimposes and outputs said information signal produced by the 2nd signal regeneration section to the signal reproduced from the 1st record section. According to this regenerative apparatus, it can prevent copying illegally and taking out only contents data, such as image information, and examination of the source of contents also becomes possible.

[0035] Moreover, the 3rd playback section which reproduces the superposition signal with which the aforementioned regenerative apparatus was preferably created further using the data with which the output from the record regenerative apparatus of an optical disk should be forbidden, It has the code decoder of the signal reproduced from the 1st record section, and the 3rd playback section, the 1st which are prepared for the both sides of a code decoder and the 2nd mutual recognition section, and only when the 1st and 2nd mutual recognition section attests each other, the code of the 1st record section is canceled. A code is canceled, only when this reproduces the enciphered main information and it attests each other.

[0036] Moreover, the aforementioned regenerative apparatus is equipped with a transmitting means to send a means to reproduce preferably the encryption data with which the output from the regenerative apparatus of an optical disk should be forbidden from the 2nd record section at least further, said encryption data, and the playback data from the 2nd record section of a plaintext to an external processing unit through a path cord.

[0037] The record regenerative apparatus of the optical disk of this invention is equipped with the recording layer which records information on a disk substrate at least. The aforementioned recording layer The 1st record section which recorded the data for contents data and its record playback, it is related with the contents recorded on the 1st record section -- secondary -- it is the record regenerative apparatus which performs record playback of contents from an optical disk equipped with the 2nd record section which records degree data as a mark of a long stripe configuration radially. This record regenerative apparatus is equipped with a means to record on the 1st record section as a production means to produce an information signal based on data including the information on a disk proper recorded on the 2nd record section that the output from said record regenerative apparatus should be forbidden, and a signal which superimposed said produced information signal on the specific signal, or to add to the 2nd record section. Preferably, the aforementioned superposition signal is the watermark produced using Disk ID. Superposition signals, such as a watermark, add the managed noise intentionally, and it cannot realize and they carry out a perfect copy. It is possible to detect a watermark etc. from the recorded data by this according to this record regenerative apparatus. Moreover, since hysteresis of contents can be clarified, an illegal copy and an unauthorized use can be prevented and it becomes possible to protect the copyright of contents.

[0038] Moreover, the aforementioned record regenerative apparatus equips the 2nd

record section with the watermark adjunct which adds a watermark to record ******** contents further preferably, and said watermark adjunct adds the information signal which reproduced the data recorded on said 2nd record section by the optical head, and was produced based on the reproduced data to said contents data as a watermark, and records said data containing a watermark on the 1st record section. playback of only the data which this superimposed from contents data in the usual record regeneration system -- or since playback which removes the superimposed data cannot be performed, the informational abatement and the informational alteration in the 2nd record section are difficult, and can perform prevention of an illegal copy and an unjust activity. In this case, by adopting further a format of the data of a command configuration which is not outputted in some data of the 2nd record section, such as ID, and the 2nd record section, it becomes possible to abolish correlation with the watermark production parameter on which contents data were overlapped, and the unjust copy by issuance of inaccurate watermarks, such as ID, can newly be prevented.

[0039] Moreover, a frequency-conversion means for the aforementioned record regenerative apparatus to change the regenerative signal from the 1st record section into a frequency shaft signal from a time-axis signal further preferably, and to create the 1st conversion signal, It has a means to create the mixed signal which added or superimposed the signal reproduced from the 2nd record section on said 1st conversion signal, and a reverse frequency-conversion means to change said mixed signal into a time-axis signal from a frequency shaft signal, and to create the 2nd conversion signal. Since the spread spectrum of the ID signal can be carried out, while being able to prevent degradation of the video signal of contents data according to this desirable example, playback of contents data becomes easy.

[0040] moreover, the recording apparatus concerning this invention is equipped with the recording layer which records information on a disk substrate at least, and said recording layer is related with the contents recorded on the 1st record section for record playback of contents data -- secondary -- it is the recording apparatus which records contents on an optical disk equipped with the 2nd record section which can record degree data as a mark of a long stripe configuration radially. This recording apparatus is equipped with an encryption means recorded on the 2nd record section to encipher contents based on the data which include the information on a proper in each optical disk, and a record means to record the enciphered contents data on the 1st record section. The aforementioned regenerative apparatus is preferably equipped with a watermark recovery means to reproduce further the watermark information produced using Disk ID from the input signal, and when the playback result reproduced with the watermark playback means shows a specific value, said record means records the signal which enciphered said input signal on an optical disk based on said disk ID. Preferably, the aforementioned watermark recovery means restores to a watermark using the signal which changed the input signal into frequency space from time-axis space.

[0041] The regenerative apparatus concerning this invention is equipped with the recording layer which records information on a disk substrate at least. Moreover, the aforementioned recording layer The 1st record section which recorded the data for contents data and its record playback, It has the 2nd record section which records degree data as a mark of a long stripe configuration radially. it is related with the contents recorded on the 1st record section -- secondary -- contents data are enciphered and

recorded -- having -- **** -- secondary -- it is the regenerative apparatus which reproduces contents from the optical disk with which the disk ID of a disk proper is contained in degree data. the optical head on which this regenerative apparatus reproduces data from an optical disk by the optical spot, the 1st signal regeneration section which reproduces contents data from the 1st record section using an optical head, and an optical head -- using -- from the 2nd record section -- secondary -- it consists of the 2nd signal regeneration section which reproduces degree data, and the 1st signal regeneration section is equipped with the code decoder which decodes the code of contents data using the disk ID played by the 2nd signal regeneration section. Preferably, the aforementioned 2nd signal regeneration section has a PE_RZ recovery means. after [moreover,] the aforementioned 2nd signal regeneration section oppresses a high-frequency component for the signal with which the cut off frequency reproduced the high region frequency component oppression means 1.2MHz or more from owner ** and the 2nd record section with said high region frequency component oppression means preferably -- secondary -- it restores to degree data.

[0042] moreover, the optical disk regenerative apparatus concerning this invention is equipped with the recording layer which records information on a disk substrate, and said recording layer is related with the contents recorded on the 1st record section which recorded the data for contents data and its record playback, and the 1st record section -- secondary -- it is the regenerative apparatus which plays an optical disk equipped with the 2nd record section which records degree data as a mark of a long stripe configuration radially. from the 1st signal regeneration section in which this regenerative apparatus reproduces contents data from the 1st record section, and the 2nd record section -- secondary -- it has the 2nd signal regeneration section which reproduces degree data. after oppressing a high-frequency component for the signal which, as for the 2nd signal regeneration section, a cut off frequency has a high region frequency component oppression means 1.2MHz or more, and was reproduced from the 2nd record section with said high region frequency component oppression means -- secondary -- it restores to degree data. Preferably, said subplayback means has a PE_RZ recovery means.

[0043]

[Embodiment of the Invention] Hereafter, this invention is explained still more concretely using the gestalt of operation. First, the structure of the optical disk which is the gestalt of implementation of the 1st of invention is explained. (a) of drawing 1 is the top view of the optical disk 100 of this invention. An optical disk consists of a main information field which records the main information 110, and a postscript information field which records the postscript information 101. Although not illustrated, in the main information field, a lead-in groove field and a TOC field are included like the conventional optical disk. In the case of record playback, if focal ON is carried out in a lead-in groove field and it will be in a refreshable condition, CDC (TOC) 103 of the main information will be reproduced from a TOC field. CDC 103 of the main information is formed as for example, a pit signal. A postscript information field is established in the specific section by the side of the inner circumference of an optical disk. However, you may prepare in the specific section by the side of a periphery. Let postscript information only at once be what can be written in (irreversible) including CDC 111 about the main information. Postscript information is formed in the magnitude which is the mark (configuration similar to a bar code) of a long stripe configuration, and can be seen for example radially with the naked

eye. The main information is data (contents) which can carry out record playback of the user, for example, is compression video signals, such as a film. Record playback is possible for the main information postscript information was indicated to be in the main information record section even if not required information but postscript information was not directly recorded on record playback of the main information. Postscript information is data recorded at the time of disk production, such as a serial number, and can record available management information on protection of copyrights, such as duplicate prevention and unauthorized use prevention of software. Furthermore, as explained later, a part of postscript information is data with which the output from a record regenerative apparatus to outside should be forbidden.

[0044] As shown in (b) of drawing 1 , CDC 103 of the main information in the TOC field of an optical disk 100 contains the data about postscript information. There are the stripe existence identifier 104, stripe storage capacity, the additional stripe existence identifier 105, and a stripe rear-face existence existence identifier 106 in this data. The stripe existence identifier 104 shows the existence of postscript information. In playback of an optical disk, when TOC is reproduced, by the stripe existence identifier 104, it turns out whether the postscript information (stripe) 101 is recorded, and the postscript information 101 can be reproduced certainly.

[0045] It is shown whether the additional stripe existence identifier 105 has the added postscript information. It can forbid adding postscript information and newly making processing and modification of data about disk protected mode with the postscript stripe existence identifier 105 and stripe storage capacity. Since the postscript stripe existence identifier 105 and stripe storage capacity are recorded, when the postscript information 101 on the 1st trimming is already recorded, it can calculate which capacity can record the postscript information 107 on the 2nd trimming. For this reason, when the recording device of postscript information performs 2nd trimming with TOC data, it can distinguish which is recordable. Consequently, it can prevent recording 360 degrees or more too much, and destroying the postscript information 101 on the 1st trimming. In addition, as shown in (a) of drawing 1 , it can prevent destroying front trimming data by forming the null section 108 of one or more pit signals between the postscript information 101 on the 1st trimming, and the postscript information 107 on the 2nd trimming.

[0046] The stripe rear-face existence identifier 106 shows whether postscript information is recorded on the rear face of an optical disk. If this is used, even if it is the case of the optical disk of double-sided molds, such as DVD, the bar code-like postscript information 101 is certainly reproducible. Moreover, like DVD-ROM, when the stripe of postscript information penetrates the reflective film of both double-sided disks, it is distinguished whether it is recorded, the field and the field of reverse, i.e., the rear face, which postscript information is reproducing. When recorded on the rear face, the recording layer of the rear face of an optical disk is reproduced.

[0047] Moreover, since the 1st postscript information 101 and the 2nd postscript information 107 can be identified when the count identifier of a postscript (not shown) is recorded, the record to add also becomes impossible.

[0048] Next, the format configuration of the postscript information on this operation gestalt is explained. Drawing 2 shows the physical format of the MBCA signal of the magneto-optic disk of postscript information which is a formula on the other hand. As shown in drawing 2 , CDC 111 is contained in a MBCA signal. Here, CDC 111 is set up

as 4 bytes of a synchronous sign. The shortest record period =30micrometer in here, a maximum radius = if it restricts to 23.5mm, the maximum capacity after a format will be limited for postscript information to 188 bytes or less. the identifier of CDC 111 -- (A) -- it is distinguished by the case where a playback output of all the MBCA data 113 is possible, and the format, in which the information 112 against an output was included at the time of (B) playback. That is, a part of postscript information can distinguish easily whether it is an optical disk including the signal 112 with which the output from a record regenerative apparatus was forbidden by CDC 111 contained in postscript information (stripe signal). the case where the cutting tool 3 of CDC 111 is "00000000" -- all postscript information -- the output from a record regenerative apparatus -- it is refreshable and all the MBCA data 113 are reproduced. On the other hand, when CDC 111 is "00000010", the output from a record regenerative apparatus is forbidden to 28 bytes of postscript information 112 among 188 bytes of information included in postscript information. Moreover, this data 112 is recorded as encryption data. Therefore, only 144 bytes of remaining information 113 can output outside. In the regenerative apparatus of an optical disk, setting out of the protected mode of the recording information of a disk is started so that it may explain later.

[0049] Specifically, the data 112 with which sending out from an optical disk record regenerative apparatus is forbidden are a key for decoding the scramble of the main information based on a part of information about the private key for decoding ID information which the information which enciphered a part of ID information on a disk and ID information enciphered the part, or ID information. In a user side, since a part of postscript information cannot carry out playback detection, unjust processing and an unjust alteration of MBCA data etc. of postscript information become difficult. By preparing protected mode, protection and access privilege of management information, such as an individual and an enterprise, are strengthened dramatically. Therefore, information, such as a data file, can be protected, such as preventing informational unjust runoff.

[0050] Below, actuation of the optical disk which has the above configurations is explained. In the case of the optical disk using the perpendicular magnetic anisotropy films which have the magneto-optical effect in a recording layer, informational record and informational elimination heat a recording layer locally by the exposure of a laser beam beyond temperature with the small coercive force more than compensation temperature, or the temperature near Curie temperature, reduce the coercive force of the recording layer in the exposure section, and are performed by making the sense of an external magnetic field magnetized (informational record is performed by the so-called "heat magnetic recording"). Moreover, playback of the record signal irradiates the laser beam of reinforcement smaller than the laser beam at the time of record and elimination at a recording layer, and is performed by detecting the situation which the plane of polarization of the reflected light or the transmitted light rotates according to the record condition of a recording layer, i.e., the sense of magnetization, as luminous-intensity change using an analyzer. Rotatory polarization happens based on the magneto-optical effect of the so-called Kerr effect and the so-called Faraday effect. In this case, in order to make interference during magnetization of the reverse sense small and to perform high density record, the magnetic material which has a vertical magnetic anisotropy is used for the recording layer of an optical disk. Moreover, by carrying out induction of the local

temperature rise or local chemical change by optical absorption when irradiating a laser beam as an ingredient of a recording layer, the ingredient which can record information is used, at the time of playback, the laser beam from which the time of record, reinforcement, or wavelength differs a local change of a recording layer is irradiated, and detection of a regenerative signal is performed by the reflected light or transmitted light.
[0051] (a) of drawing 3 shows the configuration of the magneto-optic disk in this operation gestalt. On the disk substrate 131, the recording layer of a three-tiered structure which consists of the playback magnetic film 133, medium cutoff film 134, and a record magnetic film 135 through a dielectric layer 132 is formed. As a recording layer, two or more magnetic thin films with which an ingredient differs from a presentation increase the signal level at the time of information playback switched connection or by carrying out a laminating one by one, carrying out magnetostatic association, and a regenerative signal is detected. On the recording layer, the laminating of the medium dielectric layer 136 and the reflecting layer 137 is carried out one by one, and the overcoat layer 138 is further formed on it. Two or more BCA sections 120a and 120b are recorded on the disk circumferencial direction as postscript information by the recording layer. Here, BCA (Burst Cutting Area) means the field which recorded the mark of the shape of a long stripe radially (in configuration similar to a bar code).
[0052] Next, the manufacture approach of the magneto-optic disk in the gestalt of this operation is explained. First, the disk substrate 131 with which the guide rail or pre pit for a tracking guide was formed is produced by the injection-molding method using polycarbonate resin. Subsequently, the dielectric layer 132 of 80nm of thickness which consists of an SiN film is formed on the disk substrate 131 by performing reactive sputtering to Si target in the ambient atmosphere containing Ar gas and nitrogen gas. The recording layer is constituted by the playback magnetic film 133 which consists of GdFeCo film which is Curie-temperature Tc1, the compensation presentation temperature Tcomp1, and coercive force Hc1, the medium cutoff film 134 which consists of an SiN film which is a nonmagnetic dielectric film, and the record magnetic film 135 which consists of TbFeCo film which is Curie-temperature Tc2 and coercive force Hc2. On a dielectric layer 132, magnetic films 133 and 135 are produced by performing DC sputtering to each alloy target in Ar gas ambient atmosphere, and carry out the laminating of the nonmagnetic dielectric film 134 one by one by performing reactive sputtering in the ambient atmosphere containing Ar gas and nitrogen gas at Si target. Subsequently, the medium dielectric layer 136 of 20nm of thickness which consists of an SiN film is formed on a recording layer by performing reactive sputtering to Si target in the ambient atmosphere containing Ar gas and nitrogen gas. Subsequently, the reflecting layer 137 of 40nm of thickness which consists of AlTi film is formed on the medium dielectric layer 136 by performing DC sputtering to an AlTi target in Ar gas ambient atmosphere. Finally, after ultraviolet-rays hardening resin is dropped on a reflecting layer 137, the overcoat layer 138 of 8 micrometers of thickness is formed on a reflecting layer 137 by applying said ultraviolet-rays hardening resin at the rotational frequency of 3000rpm, irradiating ultraviolet rays, and stiffening said ultraviolet-rays hardening resin by the spin coater.
[0053] Here, the playback magnetic film 133 is set as the presentation to which 320 degrees C and the compensation presentation temperature Tcomp1 have [thickness / 40nm and Curie-temperature Tc1] a magnetic anisotropy in film surface inboard at 310 degrees C and a room temperature. Moreover, as for the medium cutoff film 134,

thickness is set as 20nm and a nonmagnetic SiN film. Moreover, as for the record magnetic film 135, the coercive force Hc3 in 280 degrees C and a room temperature is set [thickness] as the 18K oersted for 50nm and Curie-temperature Tc3, respectively.
[0054] Next, the playback principle in the recording layer of this three-tiered structure is explained, referring to drawing 4 . The record domain 130 of an information signal is recorded on the record magnetic film 135. At a room temperature, the playback magnetic film 133 has the magnetic anisotropy in film surface inboard, moreover, since the magnitude of magnetization of the record magnetic film 135 is small, magnetization is intercepted with the medium cutoff film 134, and the static magnetic field from the record magnetic film 135 is not imprinted for it by the playback magnetic film 133. Therefore, by low-temperature section 129b of laser beam spot 129a, the signal of the record magnetic film 135 is not imprinted by the playback magnetic film 133 at the time of signal regeneration. However, in elevated-temperature section 129c of laser beam spot 129a, the temperature of the playback magnetic film 133 rises to near the compensation presentation temperature, when magnetization of the playback magnetic film 133 decreases, induction of the magnetization of a film surface perpendicular direction is carried out, and moreover, since magnetization of the record magnetic film 135 becomes large by the temperature rise, in order that the magnetic connection by the static magnetic field may work, the direction of magnetization of the playback magnetic film 133 is imprinted in the direction of the record magnetic film 135. For this reason, the record domain 130 of an information signal will be in the condition that the mask of the low-temperature section 129b which is a part of laser beam spot 129a was carried out. Therefore, it becomes reproducible [a record signal] only from elevated-temperature section 129c for a core of laser beam spot 129a. This playback system is a configuration which the static magnetic field by forming the medium cutoff film 134 between the playback magnetic film 133 and the record magnetic film 135 commits. And since the signal of the record magnetic layer 135 imprints only the elevated-temperature part of the core of optical spot 129a to the playback magnetic film 133 It is the magnetic super resolution method called "CAD (Center Aperture Detection)" by the static magnetic field method, and becomes reproducible [the signal in a field smaller than a laser beam spot] by using this playback system. On the other hand, magnetic super resolution is a formula, and CAD means the approach of detecting a signal only from a part for the core where the temperature in which the laser beam spot carried out temperature up is high. Moreover, the same playback is attained even if it is the case where the magnetic super resolution method called "RAD" which can reproduce a signal only from "FAD" which can reproduce a signal, or the elevated-temperature section of a laser beam spot is used only from the low-temperature section of a laser beam spot using the switched connection force between each magnetic layer.
[0055] Next, record of the postscript information in this magneto-optic disk is explained, referring to drawing 5 . (a) of drawing 5 shows the laser recorder of the postscript information in the gestalt of operation of this invention, and (b) shows the optical configuration of this recording device. Since postscript information uses as the record regenerative apparatus of the disk for DVD at common use, RZ (Return to Zero) record is used as a recording method of postscript information, and it is making it into the technical content in which a format of a record signal also has compatibility.
[0056] First, the sense of magnetization of the recording layer of a magneto-optic disk

140 is arranged with an one direction using a magnetization machine (not shown). Since the record magnetic films 135 of a recording layer are perpendicular magnetic anisotropy films which have the coercive force of a 18K oersted, they can arrange the sense of magnetization of a recording layer with an one direction by setting the magnetic field strength of the electromagnet of a magnetization machine as a 20K gauss, and passing a magneto-optic disk 140. It is inputted into the input section 409, and Disk ID is enciphered by the code encoder 430, next the disk ID (postscript information) generated by the serial number generating section 408 is encoded with the ECC encoder 407. Next, in the PE-RZ modulation section 410, it becomes irregular corresponding to a modulation clock, and is sent to the laser luminescence circuit 411. Subsequently, as shown in the condensing section 414 of (b), using the high power laser 412, such as an YAG laser, and a 1 direction-focusing lens like a cylindrical lens 417, the laser beam of the stripe configuration of a long rectangle is radially completed on the recording layer of a magneto-optic disk 140, and two or more BCA sections 120a and 120b (refer to (a) of drawing 3) are recorded on a disk circumferencial direction. If the BCA sections 120a and 120b are detected, PE (phase encoding) recovery is carried out from the recorded signal using a BCA reader (not shown) and it is in agreement with record data as compared with record data, record of postscript information will be completed. In addition, since the range of fluctuation of a reflection factor becomes 10% or less in the case of this magneto-optic disk, there is no effect in focal control.

[0057] Next, the playback principle of the BCA signal of postscript information is explained. Drawing 6 shows the car hysteresis loop in a direction vertical to the film surface of BCA section 120a shown in (a) of drawing 3 , and non-BCA section 120c. It turns out that the car angle of rotation and vertical magnetic anisotropy of BCA section 120a which are heat-treated by the stripe configuration have deteriorated substantially. Thus, since BCA section 120a is heat-treated by the exposure of a laser beam, the vertical magnetic anisotropy is low (the magnetic anisotropy of field inboard is dominant) and the residual magnetization in a film surface perpendicular direction is lost, it becomes impossible to perform a magneto-optic recording, and a detecting signal is not outputted. However, when parts other than the BCA section of a recording layer (non-BCA section 120c) irradiate, since that part is magnetized by the one direction vertical to a film surface, the playback wave of the postscript information by the differential signal by rotatory polarization as the plane of polarization of the reflected light rotated, and the differential signal of the photodetector (PD) divided into two outputted, consequently shown in (b) of drawing 3 is acquired. As mentioned above, the signal of the postscript information on the BCA section is promptly detectable from a BCA regenerative signal using the optical head for magneto-optic-recording playback.

[0058] The record power of the BCA record in the case of a magneto-optic disk can actually record a BCA signal from the optical charge side side of a magneto-optic disk using the BCA trimming equipment (BCA recording apparatus (YAG laser 50W lamp excitation CWQ pulse record)) by Matsushita Electric Industrial Co., Ltd. of a configuration as shown in drawing 5 .

[0059] Next, the record regenerative apparatus of a magneto-optic disk is explained, referring to drawing 7 and drawing 8 . In addition, although a configuration and the detection approach of a regenerative signal differ from the optical head of an optical configuration as shown in drawing 8 , as shown in drawing 7 , the basic configuration and

basic actuation of the regenerative apparatus of an optical disk are common in the case of optical disks, such as DVD-ROM or DVD-RAM, and DVD-R.

[0060] Drawing 8 shows the optical configuration of the record regenerative apparatus of a magneto-optic disk. In the optical head 155, the laser beam of the linearly polarized light injected from the laser light source 141 driven by the pulse generating laser actuation circuit 154 is changed with a collimate lens 142, and turns into a laser beam of parallel light. Only P polarization passes a polarization beam splitter 143, is condensed on a magneto-optic disk 140 with an objective lens 144, and this laser beam is irradiated by the recording layer of a magneto-optic disk 140. At this time, the information on the usual record data (the main information) is recorded by changing selectively the direction of magnetization of perpendicular magnetic anisotropy films (facing up and facing down), and the reflected light (or transmitted light) from a magneto-optic disk 140 changes as rotatory polarization according to the magnetization condition by the magneto-optical effect. Thus, the reflected light which carried out rotatory polarization is separated in the direction of signal regeneration, and the direction of focal tracking control by the half mirror 146, after being reflected by the polarization beam splitter 143. A travelling direction is divided into P polarization component and each S polarization component by the polarization beam splitter 148 after plane of polarization rotates 45 degrees of light separated in the direction of signal regeneration with lambda/4 plate 147. The light divided into the 2-way is detected by photo detectors 149 and 150 as each quantity of light. And change of rotatory polarization is detected as a differential signal of the quantity of light detected by two photo detectors 149 and 150, and the regenerative signal of data information is acquired by this differential signal. Moreover, the light of the direction of focal tracking control separated with the half mirror 146 is used for focal control and TORRAKKINGU control of an objective lens 144 by the focal TORRAKKINGU light sensing portion 153. In addition, the magnetic head 151 is driven by the magnetic-head actuation circuit 152.

[0061] The BCA field which is the postscript information on a magneto-optic disk is detected using the same playback system as the main information. As for the BCA sections 120a and 120b ((a) of drawing 3) heat-treated, the vertical magnetic anisotropy has deteriorated substantially (hysteresis loop 120a of drawing 6). Since the sense of magnetization at the time of production of a recording layer or playback of a signal of perpendicular magnetic anisotropy films is arranged with the one direction, according to the sense of magnetization of the plane of polarization, only thetak rotates to an one direction and the laser beam which carried out incidence to the large non-BCA sections 120c and 120d of a vertical magnetic anisotropy which are not heat-treated is reflected in it. On the other hand, by heat-treating, in the BCA sections 120a and 120b in which the vertical magnetic anisotropy has deteriorated substantially, since the car angle of rotation is very small, the laser beam which carried out incidence is reflected, without the plane of polarization hardly rotating.

[0062] Here, as an approach of arranging the sense of magnetization of perpendicular magnetic anisotropy films with an one direction using the record regenerative apparatus of the magneto-optic disk of drawing 7 at the time of playback of a BCA field, it is possible by impressing the fixed field of 200 or more oersteds to a magneto-optic disk 140 by the magnetic head 151, irradiating a laser beam 4mW or more so that the record magnetic film 135 of the recording layer of a magneto-optic disk 140 may become more

than Curie temperature. Consequently, with the differential signal same as change of the deflection direction of a recording layer as the main information, the postscript information on a BCA field is detected and is made.
[0063] Moreover, in the gestalt of this operation, although the differential signal has detected postscript information, if this playback system is used, since a quantity of light fluctuation component without polarization is mostly cancellable, when reducing the noise by quantity of light fluctuation, it is effective.
[0064] (a) of drawing 9 and (b) show the playback wave at the time of detecting postscript information actually by record current 8A, respectively. (a) is the wave photograph of a differential signal here, and (b) is the wave photograph of an addition signal. As shown in (a), it turns out that the pulse shape of the identification information of gain sufficient in a differential signal is detected. Since a recording layer is change of only magnetic properties at this time, and change of an average refractive index is 5% or less even if it is the case where a part of recording layer crystalizes, fluctuation of the amount of reflected lights from a magneto-optic disk becomes 10% or less. Therefore, the fluctuation of a playback wave accompanying change of the amount of reflected lights is dramatically small. At this time, by setting the record current of a laser beam as 8-9A, the playback wave indicated to be (a) of drawing 9 to (b) is acquired, a BCA image is observed by only the polarization microscope, and it cannot observe with an optical microscope.
[0065] in addition, the approach of recording BCA ****** as postscript information in the gestalt of this operation, after arranging the sense of magnetization of the record magnetic film 135 of a recording layer with an one direction (after magnetizing) -- or how to impress the field of an one direction is explained, irradiating a laser beam at the disk which recorded the BCA signal using the record regenerative apparatus. However, it is also possible to arrange the sense of magnetization of the perpendicular magnetic anisotropy films of a recording layer with an one direction, irradiating stroboscope light etc. and raising the temperature of a recording layer.
[0066] Moreover, the recording layer 35 of this magneto-optic disk has the coercive force of a 18K oersted at a room temperature. However, if stroboscope light, a laser beam, etc. are irradiated and temperature up is carried out to 100 degrees C or more, since coercive force becomes below a 6K oersted, the sense of magnetization of a recording layer can be arranged with an one direction by impressing the field more than the 8K oersted which is a field smaller than the field in the case of magnetizing at a room temperature.
[0067] Moreover, although the recording layer in this magneto-optic disk is a three-tiered structure which consists of the playback magnetic film 133, medium cutoff film 134, and a record magnetic film 135, it can record postscript information by reducing remarkably the magnetic anisotropy of a direction vertical to the film surface of the part which heat-treated the record magnetic film 135 at least, and making it into a property with the almost dominant magnetic anisotropy of field inboard.
[0068] Moreover, the same effectiveness is acquired even if it is the case where the vertical magnetic anisotropy of all the magnetic films of the vertical magnetic anisotropy of at least one magnetic film or the playback magnetic film 133, the medium magnetic film 134, and the record magnetic film 135 is degraded among the playback magnetic film 133 and the record magnetic film 135.
[0069] Moreover, by addition of the various elements with which selection of a

presentation differs from the magnitude of a vertical magnetic anisotropy, since Curie temperature, coercive force, etc. of a magnetic film which constitute a recording layer can change comparatively easily, they can set up the configuration of the recording layer of a magneto-optic disk, and production conditions and the record conditions of postscript information the optimal according to the record playback conditions required of a magneto-optic disk.

[0070] In addition, in this magneto-optic disk, the GdFeCo film, the TbFe film, and the TbFeCo film are used as an SiN film and a magnetic film as polycarbonate resin and dielectric layers 132 and 136 as a disk substrate 131, respectively. However, plastics, such as glass or polyolefine, and PMMA, can be used as a disk substrate 131. As dielectric layers 132 and 136, the film of the film of chalcogen compounds, such as film of other nitrides, such as AlN, film of the oxide of TaO2 grade, or ZnS, or the mixture using these two or more kinds can be used. The magnetic material which has vertical magnetic anisotropies, such as rare earth metal-transition-metals system ferrimagnetism film with which an ingredient differs from a presentation as a magnetic film or MnBi, and PtCo, can be used. The much more configuration [try] may be used also for the configuration of a recording layer, and also it may be a multilayer configuration.

[0071] Here, the procedure of the playback approach using postscript information is explained using the flow chart of drawing 10 and drawing 11 . a disk inserts -- having (step 302) -- first, a focus and tracking are set up (step 301a), and in a normal disk, focal ON is carried out in a lead-in groove field, it will be in a refreshable condition (step 301b), and TOC (Control Data) will be reproduced (step (301c).) When a lead-in groove field or TOC is not reproduced here, it becomes an error and stops.

[0072] Since the stripe existence identifier 104 is recorded by the pit signal in TOC of the TOC field 103 of the main information as shown in drawing 1 , when TOC is reproduced, it is turned out whether postscript information (stripe) is recorded. Then, 0 or 1 is first distinguished for the stripe existence identifier 104 (step 301d). When the stripe existence identifier 104 is 0, an optical head moves to the periphery section of an optical disk, it changes to revolution phase control, and playback is performed for the data of the data area 110 of the usual main information (step 303).

[0073] In addition, the identifier of the main information which shows the existence of the existence of postscript information is detected based on the sum signal of the detecting signal from the detection light which received light by the detecting signal or two or more photo detectors from the detection light which received light by at least one photo detector of an optical head. When said identifier is detected and existence of said postscript information is checked, said optical head is moved to the specific section of said optical disk with which said postscript information was recorded if needed. According to this configuration, a stripe, a defect, etc. of postscript information can be distinguished easily. For this reason, the build up time of equipment can be shortened, and compatibility can be given to playback of postscript information even if it is the optical disk of a different playback system.

[0074] When the stripe existence identifier 104 is 1 next, by the double-sided type disk, it is distinguished like DVD-ROM whether it is recorded on the field which the stripe is reproducing and the field of reverse, i.e., a rear face, (step 301e). (is the rear-face existence identifier 106 1 or 0?) When the rear-face existence identifier 106 is 1, the recording layer of the rear face of an optical disk is reproduced (step 301p). In addition,

in the case of the magneto-optic disk of veneer structure, the rear-face identifier 106 is always 0. Moreover, when the rear face of an optical disk is automatically unreproducible depending on a regenerative apparatus, "rear-face playback directions" is outputted and displayed. When it is judged that the stripe is recorded on the field under playback at steps 301d and 301e, it moves to the field 101 of the stripe of the inner circumference section of an optical disk, and an optical head changes to rotational-speed control, carries out a CAV revolution, and reproduces the signal 111 of the TOC field of a stripe (step 301f).

[0075] Here, when the field 112 where the output from a record regenerative apparatus should be forbidden into a stripe signal does not exist by playback of the signal 111 of the TOC field of a stripe 101, (step 301g) and the signal 113 of a stripe are reproduced (step 304a). Next, when it is distinguished whether playback of the signal 113 of a stripe was completed (step 304b) and playback of the signal 113 of a stripe is completed, an optical head moves to the periphery section of an optical disk, it changes to revolution phase control again, the usual CLV playback is performed, and the data of the pit signal or the main information that the signal 113 of a stripe was added are reproduced (step 304c).

[0076] When the information signal 112 with which the output from a record regenerative apparatus is forbidden in the stripe signal exists by playback of the signal 111 of the TOC field of a stripe, setting out of the protected mode of the recording information of YES) and a disk is started by (step 301g. First, the command of protected mode is set up and the remaining postscript information 112 and 113 is reproduced (step 301h). Here, when protected modes other than the command which can be set up are set as the optical disk, it becomes an error and playback of a disk stops.

[0077] If the command of protected mode is set up and playback of the postscript signals 112 and 113 of a stripe is completed (step 301i), detection of a private key will be performed from the enciphered media ID (step 301j). Here, said media ID are signals which modulate encryption or information and have been recorded, and since they are the information 112 to which the output from a record regenerative apparatus is forbidden, they are unreproducible by the user side at the time of playback of a disk. Next, the playback command of the data file protected is set up using the information signal produced using said private key or it (step 301k). Here, when set as the data file of protected modes other than the command which can be set up, it cannot go into the playback mode of a protection file. Setting out of the playback command of the data file protected starts decoding of a protection file (step 301l.). When decoding of a protection file is not completed, it repeats from the check (step 301k) of the information on a private key again. Here, when the playback command of a protection file cannot be set up more than the count of fixed, playback of a disk stops as an error (step 301m). If decoding is completed, closing and protected mode are canceled in a file (step 301n), and the data of the main information other than a protection file will be in a refreshable condition.

[0078] Also when decoding of a protection file is not completed (it is NO at step 301m), it repeats from setting out (301k) of the playback command of data again. Here, playback of a disk is ended also when a playback command is not set up more than the count of predetermined.

[0079] Playback of a stripe 101 is completed, when protected mode is canceled, (step 301n) and an optical head move to the periphery section of an optical disk (step 303), and it changes to revolution phase control again, and playback of the data of the usual pit

signal and the data of the signal of the main information is performed.
[0080] Thus, a stripe 101 is certainly reproducible by recording the stripe existence identifier 104 on pit fields, such as TOC. Moreover, a part of postscript information on a stripe can distinguish easily whether it is an optical disk including the signal 112 with which the output from a record regenerative apparatus was forbidden by CDC 111 contained in a stripe signal.
[0081] Next, it explains still more concretely about the system which consists of an optical disk record regenerative apparatus shown in drawing 12 , and a personal computer. The optical disk record regenerative apparatus 320 sends the information on an optical disk 140 to a personal computer 322 through the SCSI interface 321. Information is processed by CPU323 in a computer, and information is kept in a memory area 324. Moreover, although explained using SCSI as an interface, ATAPI1394, USB, etc. should just be the configurations which can carry out the transmission output of the postscript information together with the signal of the main information.
[0082] Here, in the optical disk of the conventional configuration, in order to judge whether utilization of the playback information on the main information, processing, a copy, etc. are possible, postscript information, such as a BCA signal, was also doubled and reproduced and it used for processing of the main information. However, since all the contents of postscript information were reproduced and it outputted on a computer, though ID information etc. was enciphered, it may have decoded. With this operation gestalt, an output is forbidden to a part of postscript information, and since the information used only within the drive may be included, the regeneration in that case is explained.
[0083] Drawing 13 is the flow chart of the playback approach of the MBCA signal which is the postscript information in the optical disk of this operation gestalt. First, a MBCA playback command is inputted through an interface 321 from a computer 322 for playback of a MBCA signal (step 311a). Then, if a playback command is received, the optical disk record regenerative apparatus 320 reads a MBCA signal (step 311b), and stores it in the memory of the optical disk record regenerative apparatus 320.
[0084] Next, in the case of the MBCA signal of a format configuration as shown in drawing 2 , the cutting tool 3 of CDC of MBCA is reproduced first (step 311c). Since all MBCA data are sent out when the cutting tool's 3 content is 00h (step 311d), it is outputted on a computer 322 through connection of an interface 321 (step 311h), and all the contents of the MBCA signal can be checked with a personal computer 322 as usual.
[0085] However, since all MBCA data cannot be sent out when the cutting tool's 3 content is 02h, it is divided into the data which can send out MBCA data, and the data to which sending out from an optical disk record regenerative apparatus is forbidden (step 311e). And only the data in which sending out in MBCA data is possible are sent out from a record regenerative apparatus (step 311f), and it is outputted on a computer 322 through connection of an interface 321 (step 311h).
[0086] On the other hand, about the data to which sending out from the optical disk record regenerative apparatus in MBCA data is forbidden, within an optical disk record regenerative apparatus, although reproduced (step 311g), since it is not outputted out of equipment, it is used only within an optical disk drive (step 311i). Therefore, on a computer 322, since all the contents of the MBCA signal cannot be checked, decode of the postscript information on disk propers, such as ID information, becomes impossible.

For this reason, protection of the contents currently recorded as main information becomes more powerful. Thus, in the case of an optical disk including the signal 112 with which the output from a record regenerative apparatus was forbidden to a part of postscript information on a stripe, it is impossible to reproduce the stripe information 112 about Disk ID or a private key by the user side, and the optical disk protected in the main information very powerfully and its record playback approach can be realized to it.

[0087] Although an optical disk is played in the above-mentioned playback procedure, recovery actuation is briefly explained using the record regenerative apparatus of the optical disk of drawing 7 . In optical disk 140a on which the BCA signal of postscript information was recorded, the stripe existence identifier 104 (refer to drawing 1) which shows whether BCA exists in CDC 103 of the main information is recorded. Like ROM disk 10, it is the configuration that two transparence substrates were stuck so that signal side side 10a may come to inside in a double-sided type case, and it may be two-layer [of the case where recording layer 10a is one layer, and recording layers 10a and 10b]. When a recording layer is two-layer, the stripe existence identifier 104 which shows whether BCA exists in CDC of 1st recording layer 10a near the optical head 155 is recorded. In this case, since BCA exists in 2nd recording layer 10b, first, a focus is doubled with 1st recording layer 10a, and the optical head 155 is moved to the radius location of CDC which exists in the most inner circumference of 2nd recording layer 10b. since CDC is the main information -- the 1st recovery section 528 -- EFM or 8-15 -- or it becomes irregular eight to 16 times. Only when the stripe rear-face existence identifier 106 in this CDC is '1', in one layer and the two-layer section change-over section 597, a focus is doubled with 2nd recording layer 10b, and BCA is reproduced.

[0088] It is read in an optical disk 140 by the optical head 155, and if the photo-regenerating signal (high frequency signal) of the main information separated by the frequency separation means 534 is sliced with the 1st general slice level 515 using the 1st level slicer 590, it will be changed into a digital signal. It gets over in the EFM recovery section 525, the 8-15 modulation recovery section 526, or the 8-16 modulation recovery section 527 in the 1st recovery section 528, it decodes by the ECC decoder 536, and required processing is further outputted by carrying out this signal in code decoder 534a, the MPEG decoder 261, and the watermark playback collating section 262. Thus, recovery playback of the main information is carried out in the 1st recovery section 528. CDC in this main information is reproduced, and only when the stripe existence identifier 104 is '1', it goes BCA to reading. When the stripe rear-face existence identifier 106 is '1', CPU523 takes out directions to one layer and the two-layer section change-over section 597, drives the focal controller 598, and changes a focus from the 1st recording layer 10a to 2nd recording layer 10b. Simultaneously, the optical head 155 is moved to the radius location (BCA which is recorded from 22.3 to 23.5mm by the side of the inner circumference of CDC in the case of DVD specification) of the record section 101 of postscript information, and BCA is read.

[0089] In a BCA field, the signal with which the envelope as shown in the "regenerative signal" of (c) of (4) was selectively missing is reproduced. [of drawing 1] When the low frequency signal of the photo-regenerating signals sets up the 2nd slice level 516 of the quantity of light lower than the 1st slice level 515 in the 2nd level slice section 529, the BCA section without the rotatory polarization of BCA or the BCA section which lacked the reflecting layer is detected, and a digital signal is reproduced. It gets over by PE-RZ

recovery section 530a of the 2nd recovery section 530, ECC decoding is carried out by ECC decoder 530b, and this signal lets the BCA output section 550 pass, and is outputted as BCA data which are postscript information. Thus, recovery playback of the BCA data which are postscript information in the 2nd recovery section 530 is carried out.
[0090] However, in the magneto-optic disk of this operation gestalt, when an output should be forbidden by CDC 111 of postscript information, since the postscript information 112 to which the output was forbidden is not outputted through the BCA output section 550, only the regenerative signal of the refreshable remaining postscript information 113 is outputted out of a record regenerative apparatus.
[0091] Here, actuation of the recovery output circuit of the MBCA signal in an optical disk record regenerative apparatus is explained. As shown in drawing 14 , in the 2nd recovery section 530, the regenerative signal of MBCA carries out a PE-RZ recovery, and is reproduced (step 314a), and an ECC error correction is carried out by ECC decoder 530b (step 314b). And the 2nd recovery section 530 memorizes (step 314c). Here, the address counter of the information the MBCA signal is remembered to be is set up by CDC 111 of MBCA (step 314d). When the cutting tool 3 of CDC 111 is 00h, the counter of read-out is specifically set as 4, and when a cutting tool 3 is 02h, the counter of read-out is set as 32. And the MBCA information on the address after the set-up counter is reproduced, and it is outputted with image information through an interface from the BCA output section 550. Consequently, utilization of some data of MBCA which is postscript information is attained only within a drive, without being outputted from a record regenerative apparatus. Moreover, the location of the address of a read-out counter is extensible to arbitration by setting a playback command as the different address.
[0092] (a) of drawing 15 is the sectional view showing the configuration of the optical disk of the phase change mold in the gestalt of operation of the 2nd of this invention. On the disk substrate 311, the recording layer 313 which consists of a phase change ingredient which may change between a crystal phase and amorphous phases reversibly through a dielectric layer 312 is formed. Thereby, while information is recordable using the difference in the optical property based on a reversible structural change on the atomic level between a crystal phase and an amorphous phase, information is reproducible as a difference of the amount of reflected lights to specific wavelength, or the amount of transmitted lights. Moreover, in the field in which postscript information was recorded, it is desirable that the difference of the amount of reflected lights between the phases of two conditions of the light irradiated is 10% or more in this case. According to this desirable example, the regenerative signal of the 2nd record section which is postscript information can be acquired certainly, and detection of playback information becomes easy. Two or more BCA sections 310a and 310b are recorded on the disk circumferencial direction by the BCA field of a recording layer 313. On the recording layer 313, the laminating of the medium dielectric layer 314 and the reflecting layer 315 is carried out one by one, and the overcoat layer 316 is further formed on it. And the disk of two sheets with which only the 1st optical disk has the overcoat layer 316 is stuck by the glue line 317. In addition, you may be the configuration that the optical disk of two sheets of the same configuration was stuck by the hot melt method. The optical disk equipped with the recording layer which consists between two detectable conditions of the above thin films which may change reversibly optically is high-density, and is applied to DVD-RAM etc. as a rewritable commutative medium.

[0093] Moreover, although an above-mentioned optical disk sticks the disk of two sheets, (c) of drawing 15 shows the configuration of the optical disk of the phase change mold which consists only of a disk of one sheet. Although it differs in that the recording layer 160 of a phase change mold with a thickness of 10nm is formed in the medium of the dielectric layer 132 with a thickness of 100nm and the medium dielectric layer 136 with a thickness of 10nm, others have the same structure. Moreover, since it is the disk of the lamination of two sheets in DVD-RAM and DVD-RW, substrate 131a and glue line 138a are added.

[0094] In the optical disk in which corresponds to the exposure conditions of the light irradiated and a recording layer carries out a phase change reversibly between a crystal phase and an amorphous phase, if formation of the BCA section is explained, for example in the 2nd record section, the bar code section of a bar code-like pattern is formed with an amorphous phase, and between bar codes can be formed by the crystal phase. Moreover, after, forming the recording layer of a low reflection factor with an amorphous phase by forming a record ingredient layer on a substrate for example, laser is irradiated at the part which corresponds between the bar codes of the 2nd record section, and a bar code-like pattern is formed by forming the recording layer of a high reflection factor.

[0095] In addition, although the phase change ingredient of a GeSnTe alloy was used in the above-mentioned optical disk, even if it uses an organic material or other phase change ingredients, and the ingredient that changes structurally, what is necessary is just the ingredient which changes optically between two conditions.

[0096] Moreover, in optical disks (not shown), such as DVD-ROM, postscript information which the main information is recorded on the 1st record section by the pit of the irregularity of the reflective film etc., and is different for every disk, or its enciphered postscript information against an output is recorded on the 2nd record section. If the disk ID against an output is recorded on postscript information where correlation with Disk ID and encryption information is completely abolished, it will become impossible to guess by the operation from Disk ID. For this reason, an illegal copy contractor can prevent publishing the new disk ID unjustly. When the main information is recorded on the 1st record section by the pit of the irregularity of the reflective film etc., postscript information can be recorded by removing the reflective film selectively.

[0097] Next, the manufacture approach of this optical disk is explained. First, the disk substrate 311 with which the guide rail or pre pit for a tracking guide was formed is produced by the injection-molding method using poly car baud NETO resin. Subsequently, the dielectric layer 312 of 80nm of thickness which consists of ZnSSiO2 film is formed on the disk substrate 311 by performing high frequency (RF) sputtering to ZnSSiO2 target in Ar gas ambient atmosphere. Subsequently, the recording layer 313 of 10nm of thickness which consists of a GeSbTe alloy is formed on a dielectric layer 312 by performing RF sputtering to a GeSbTe alloy target in Ar gas ambient atmosphere. Subsequently, it is from ZnSSiO2 film on a recording layer 313 by performing RF sputtering to ZnSSiO2 target in Ar gas ambient atmosphere. The medium dielectric layer 314 of 10nm of thickness is formed. Subsequently, the reflecting layer 315 of 40nm of thickness which consists of AlCr film is formed on the medium dielectric layer 314 by performing DC sputtering to an AlCr target in Ar gas ambient atmosphere. Subsequently, after ultraviolet-rays hardening resin is dropped on a reflecting layer 315, the overcoat layer 316 of 5 micrometers of thickness is formed on a reflecting layer 315 by applying

said ultraviolet-rays hardening resin at the rotational frequency of 3500rpm, irradiating ultraviolet rays, and stiffening said ultraviolet-rays hardening resin by the spin coater. Thereby, the 1st optical disk is obtained. On the other hand, the 2nd optical disk is produced, without forming an overcoat layer. Finally, by the hot melt method, adhesives are stiffened, a glue line 317 is formed and the 1st optical disk and 2nd optical disk are stuck.

[0098] Here, record of the information on the recording layer 313 which consists of a germanium-Sb-Te alloy is performed in the exposure section by irradiating the laser beam narrowed down to the minute spot using a local change arising, i.e., the difference in the optical property based on a reversible structural change on the atomic level between a crystal phase and an amorphous phase arising. Moreover, the recorded information is reproduced by detecting the difference of the amount of reflected lights to specific wavelength, or the amount of transmitted lights.

[0099] Next, the BCA storage to a phase-change optical disk like DVD-RAM is explained. First, the record film shown in (c) of drawing 15 is in the amorphous condition of being called an ASDE POJITTO condition at the time of film formation. Although this condition is based also on a membranous optical design, it shows a usually low reflection factor. It will crystallize, if it is made to dissolve by laser radiation, and this kind of phase-change optical disk serves as a high reflection factor. Actually, irradiate the whole surface, the optical disk after a film production process is made to crystalize laser, and an optical disk is shipped in the condition of having made it the high reflection factor. This process is called initialization process. the information to record of the address, a truck, etc. that the high reflection factor is more indispensable -- reading -- ** and ** -- being easy -- since -- it is .

[0100] There are two approaches in BCA record of a phase-change optical disk. The 1st approach is an approach of hitting laser to the field which are an YAG laser and high power semiconductor laser, and has become a crystal phase like a magneto-optic-recording medium. The laser radiation section changes with temperature rises from a crystal phase with a high reflection factor to an amorphous phase with a low reflection factor. If laser power is strengthened further, since a part of recording layer or reflecting layer will move by fusion or sublimation, the reflection factor of a laser radiation part becomes low compared with the non-irradiating section. In this way, since a part with a high reflection factor and a low part are formed, a BCA regenerative signal as shown in (4) of (c) is reproduced by the optical head of a DVD drive. [of drawing 1]

[0101] In a phase change mold disk, when the 2nd approach is explained, when a recording layer is formed by sputtering etc., it is in the amorphous condition called an AZUDEPO condition, and is a low reflection factor at the time of manufacture. By giving a reversal record signal as shown in (7) of (c), laser is not irradiated, but the stripe section of BCA remains, while it has been in an amorphous condition, i.e., a low reflection factor. [of drawing 1] On the other hand, since the non-BCA stripe section will be in a crystallized state since laser is irradiated, and it becomes a high reflection factor, the regenerative signal with which signal level fell [the BCA stripe section] as shown in (4) of (c) is acquired. [of drawing 1] By the 2nd approach, since BCA is recordable only by setting at an initialization process, and turning on and turning off laser radiation as shown in (7) of (c), a process is simplified. [of drawing 1]

[0102] Here, the tolerance which can reproduce a BCA signal is described. Drawing 16

shows the configuration of the regenerative circuit of BCA. BCA carries out superposition record on an EMPO spit. For this reason, as the regenerative signal from an optical head is shown in (1) of drawing 17 , the high region noise by the EMPO spit has ridden. A high region noise component is removed for a cut off frequency fc by LPF161 of 1.2MHZ(s), and reversal magnification of this noise is carried out with amplifier 162. This signal is removed by HPF163 of fc=14KHZ in a noise low-pass [accompanying eccentricity], and the 2nd slice level which made the average output of the peak value of BCA abbreviation one half is created by the peak hold circuit of 320 microseconds of time constants. In a comparator 165, the inversion signal (3) of the regenerative signal of BCA is compared with this 2nd slice level (2), and binary data as shown in (4) is outputted. In this way, a BCA signal is reproduced.

[0103] Here, the antecedent basis which set the cut off frequency fc of LPF161 to 1.2MHZ(s) is described. Drawing 18 shows the modulation noise when recording BCA to the DVD-RAM disk of a phase change mold. IBMmax shows, the maximum, i.e., the worst value, of a signal of the BCA stripe mark section after LPF conversion of the signal of (1) of drawing 17 . IBSmin shows, the minimum value, i.e., the worst value, of a signal of the non-BCA section. Since the slice margin at the time of playback is required 20% or more. Unless IBMmax/IBSmin is 0.8 or less, it cannot restore to BCA with a regenerative apparatus. Drawing 18 is the result of changing fc of LPF and surveying the value of IBMmax/IBSmin. When fc makes it 1.2 or more MHZs shows becoming 0.8 or less. Thus, by making IBMmax/IBSmin of BCM of setting fc of LPF of a regenerative apparatus to 1.2 or more MHZs, and a disk or less into 0.8, it is effective in the ability of BCA to be stabilized and reproduced.

[0104] The record approach of the postscript information in the gestalt of this operation is the same as that of the case of the gestalt of the 1st operation almost. That is, using high power laser, such as an YAG laser, and a 1 direction-focusing lens like a cylindrical lens, the laser beam of a rectangular stripe configuration is completed on a recording layer 313, and two or more BCA sections 310 are recorded on a disk circumferencial direction. If the laser beam of high power is irradiated by the recording layer 313 rather than the time of the main information record, the structural change by excessive crystallization by phase transition will produce the optical disk of the gestalt of this operation. For this reason, it becomes possible to record BCA section 310a and b irreversible, and if high power is irradiated further, record film 313 will be removed. Thus, as for BCA section 310a and b, being recorded as an irreversible condition of a crystal phase is desirable. and -- such -- carrying out -- the BCA section 310 -- the BCA section 310 of the BCA field where postscript information was recorded by recording a and b -- a, b, and the non-BCA section 310 -- since the amount of reflected lights changes by c and d, postscript information is reproducible with the optical head of the regenerative apparatus of DVD-ROM. In this case, as for fluctuation of the amount of reflected lights from an optical disk, it is desirable that it is 10% or more, and it can set up fluctuation of the amount of reflected lights to 10% or more by making change of an average refractive index into 5% or more. Moreover, in the case of DVD-RAM, it not only produces an excessive structural change of a recording layer, but fluctuation of the amount of reflected lights by the signal in a BCA field becomes possible [carrying out to beyond a predetermined value] by making a part of protective layer or reflecting layer suffer a loss as well as DVD-ROM. Moreover, since it is lamination structure at this time, it is satisfactory also

in dependability.
[0105] As explained above, the recording device and the record approach of postscript information in the gestalt of the 2nd operation are the same as that of the 1st operation gestalt. However, with the 1st operation gestalt, in order to change the amount of reflected lights beyond a predetermined value with this operation gestalt to degrading only the magnetic anisotropy of a recording layer, setting out of the record power of postscript information and record conditions differs. Moreover, even if it is the case where it is set as the same record power, or in the case of a magneto-optic disk it carries out out of focus and records, you may be the approach of reducing record power through a filter and recording.
[0106] Moreover, in high density magneto-optic disks, such as ASMO, since playback of postscript information is performed using the optical head 155 of a configuration of being shown in drawing 8 , the configuration of an optical head, the detection approach of a record signal, and playback conditions differ from the record regenerative apparatus of this operation gestalt. However, also in this operation gestalt, the copyright of the main information in a disk can be powerfully managed and protected by using an output keepout area into postscript information in the same procedure as the flow chart explained with the 1st operation gestalt.
[0107] Moreover, the regenerative apparatus of the optical disk and optical disk which can prevent not only an erasable optical disk but protection of the file according to postscript information by using the information signal which is prohibition of an output and was enciphered as CDC in the postscript information on a disk proper at the time of playback even if it is DVD-ROM or an optical disk like DVD-R and an unjust copy is realizable like a magneto-optic disk or DVD-RAM.
[0108] Next, the means in which a content provider's contents carry out management protection actually is explained. First, the procedure to disk production in which contents entered is explained using drawing 19 . As shown in drawing 19 , in the disk manufacture department 19, first, with the MPEG encoder 4, variable length coding of the contents 3 of original copies, such as a film, is blocked and carried out, and they serve as compression video signals, such as MPEG by which picture compression was carried out. A scramble is applied with the code encoder 14 using the cryptographic key 20 by which this signal is produced by the BCA signal. This scrambled compression video signal is recorded as a pit-like signal on original recording 6 by the original recording production machine 5. By this original recording 6 and making machine 7, the disk substrate 8 of a large quantity with which the pit was recorded is manufactured, and reflective film, such as aluminum, is formed by the reflecting layer molding machine 15. Lamination and the lamination disk 10 are completed for two disk substrates 8 and 8a with the lamination machine 9. Moreover, in the case of a magneto-optic disk, the compression video signal by which the scramble was carried out [above-mentioned] is recorded by the recording layer as an optical MAG signal. Moreover, in the case of the disk of veneer structure, a disk 140 is completed without lamination. Moreover, in the case of DVD-RAM300, the compression video signal by which the scramble was carried out [above-mentioned] is similarly recorded on a recording layer, two disk substrates are stuck by the lamination machine 9, and a lamination disk is completed. Two kinds of disk configurations, the single type which has a recording layer only on one side in DVD-RAM300, and the double type which has a recording layer to both sides, are possible. Moreover, it is

producible by the same approach also about a DVD-R disk.
[0109] Next, a content provider explains the playback approach of the disk by recording postscript information. Drawing 20 is the block diagram of a disk manufacturing installation and a regenerative apparatus. The lamination disk or the veneer disk 10 of the ROM mold of the same content or a RAM mold is manufactured by the disk manufacture department 19. In the disk manufacturing installation 21 Disks 10a, 10b, and 10c, Identification code 12a, such as ID which uses the BCA recorder 13 for ... and is different for every one one-sheet disk, PE modulation is carried out by PE modulation section 410, laser trimming of the BCA data 16a, 16b, and 16c containing 12b and 12c is carried out using an YAG laser, and circular bar code-like BCA(s) 18a, 18b, and 18c are formed on a disk 10. Hereafter, the entire disk on which BCA18 was recorded is called the BCA disks 11a, 11b, and 11c. As shown in drawing 20 , the pit section or the record signal of these BCA disks 11a, 11b, and 11c is completely the same. However, for every disk, different ID from 1, 2, and 3 is enciphered by BCA18, and it is recorded on it as information against an output. Content providers, such as a movie company, memorize this different ID in the ID database 22. BCA data are simultaneously read with the bar code reader 24 which can read BCA at the time of shipment of a directory, and the supply place and supply time amount of of which ID to have supplied the disk to which system operator 23, i.e., a CATV firm, a broadcasting station, and an airline, are memorized in the ID database 22.
[0110] Record of to what system operator to have supplied the disk of which ID when is recorded on the ID database 22 by this. Moreover, when the BCA disk of a specified use can be produced and prevention of an illegal copy or an illegal copy appears on the market to a large quantity by setting up by encryption of ID, or the informational content provider who forbade the output at the time of playback, the supplied BCA disk 11 can be traced and specified.
[0111] As mentioned above, although the case where only contents are supplied with CATV etc. has been explained, when selling the disk with which the BCA signal which has recorded contents was recorded, protection of contents can be performed similarly.
[0112] What is necessary is just to use the record regenerative apparatus of the 1st operation gestalt, and the record regenerative apparatus of the same configuration, in selling the BCA disk of drawing 20 to a general user. At this time, as shown in the flow chart of drawing 10 and drawing 11 , ID information which the output keepout area of the above-mentioned BCA disk enciphered can be read, a private key can be produced within a record regenerative apparatus, and the copyright of a disk can be protected by the same record playback approach as the 1st operation gestalt of decoding a protection file.
[0113] Furthermore, if it is the method which offers a private key using a communication line, it will become manageable [more positive contents]. That is, with the flow chart of drawing 10 and drawing 11 , when the media ID as which (step 301i) was enciphered are reproduced, a communication line is used for a content provider or the management contractor of software, and playback information is sent to him. If it does so, by the content provider side, decode and collating of the code of media ID information are performed, and if it is the disk of normal, the information about the private key of which the scramble of contents is canceled will be supplied. Using the information about the private key, the file of the contents protected is decoded and it reproduces (step 301l.). since [in this case,] the postscript information on each contents proper, such as Disk ID,

is always manageable -- the activity of unjust postscript information -- ** -- it can discover easily.
[0114] If the enciphered media ID are recorded on BCA where correlation is completely abolished with Disk ID and a cipher system, it will become impossible in this case, to guess by the operation from ID. That is, only the copyright person will know the relation between ID and its encryption operation. For this reason, an illegal copy contractor can prevent publishing unjustly information which enciphered new ID or new it.
[0115] Furthermore, a spectrum signal is generated using a specific operation from the information on user propers, such as the card ID of an IC card, and it can encipher by adding to the ID signal 38 of a disk. In this case, since both individual humanity news of Media ID and a user needs to be collated, issuance of unjust ID information becomes still more difficult. And since a copyright person can check the both sides of the negotiation ID of software, and ID of a regenerative apparatus, it becomes easy, a trace, i.e., trace, of an illegal copy, further [him].
[0116] furthermore, by other approaches of protecting contents As shown to the Records Department of the record regenerative apparatus of drawing 21 , in recording the main information, such as a video signal, on the disk 140 which recorded BCA First, the BCA signal containing a different disk ID for every optical disk is read by the BCA playback section 39. By superimposing as a watermark the signal produced with the BCA signal of postscript information, a video signal is changed and the video signal after conversion is recorded on the BCA disk 140 (10,300). For example, a watermark is produced based on Disk ID. In reproducing a video signal from the BCA disk 140 (10,300) with which the video signal with which it was superimposed on the BCA signal was recorded, first, the BCA signal of a disk is read in the BCA playback section 39, and it detects as ID1 of a disk, and produces a private key. the approach of producing a private key at this time -- the inside of a record regenerative apparatus -- it is collated and supplied. A system operator or a software management contractor may perform collating of this private key, production, and supply using a communication line.
[0117] Next, the information on the disk proper on which the video signal was overlapped is detected as a disk ID 2 in the watermark playback section which restores to a watermark. When the private key produced from the BCA signal ID 1 is compared in the disk ID 2 read in the superposition signal of a video signal and a private key is not in agreement with a superposition signal, playback of a video signal is suspended. Consequently, it is copied unjustly and a video signal cannot be reproduced from the disk with which it was superimposed on a different signal from the information hidden in the BCA signal. On the other hand, when both are in agreement, scramble discharge is carried out and the video signal with which the descrambler 31 was overlapped on the watermark using the decode key including ID information by which reading appearance was carried out from the BCA signal is outputted as a video signal.
[0118] When sending image information by the above methods using a communication line, the BCA disks 10a, 10b, and 10c including the BCA information enciphered by the disk manufacturing installation 21 of drawing 20 are sent to system operators' 23a, 23b, and 23c regenerative apparatus 25a, 25b, and 25c.
[0119] Here, the actuation by the side of a system operator is explained using drawing 22 . Drawing 22 is the block diagram showing the detail of retransmission-of-message equipment. Moreover, drawing 23 is drawing showing the wave on the time-axis of the

HARASHIN number and each video signal, and the wave on a frequency shaft. As shown in drawing 22 , regenerative-apparatus 25a only for system operators is prepared in the retransmission-of-message equipment 28 installed in a CATV office etc., and it is equipped with BCA disk 11a supplied by the movie company etc. at this regenerative-apparatus 25a. The data playback section 30 is reproduced and the main information of the signals reproduced by the optical head 29 is sent to a descrambler 31. Here, if mutual recognition was carried out with the descrambling key created by the information on user propers, such as the card ID of an IC card, after a scramble will be canceled and the HARASHIN number of an image will be elongated by the MPEG decoder 33, it is sent to the watermark section 34. In the watermark section 34, the HARASHIN number shown in (1) of drawing 23 is inputted first, and it is changed into a frequency shaft from a time-axis by frequency-conversion section 34a, such as FFT. Thereby, frequency spectrum 35a as shown in (2) of drawing 23 is obtained. Frequency spectrum 35a is mixed with ID signal which has the spectrum shown in (3) of drawing 23 in the spectrum mixing section 36. Spectrum 35b of the mixed signal is not different from frequency spectrum 35a of the HARASHIN number shown in (2) of drawing 23 , as shown in (4) of drawing 23 . That is, it means that the spread spectrum of the ID signal was carried out. This signal is changed into a time-axis from a frequency shaft by the reverse frequency-conversion sections 37, such as IFFT, and the signal which is not different from the HARASHIN number ((1) of drawing 23) as shown in (5) of drawing 23 is acquired. Since the spread spectrum of the ID signal is carried out in frequency space, there is little degradation of a picture signal.

[0120] In drawing 22 , the image output signal of the watermark section 34 is sent to the output section 42. When transmitting the video signal with which retransmission-of-message equipment 28 was compressed, compression is applied with the MPEG encoder 43, an image output signal is scrambled with a scrambler 45 using the cryptographic key 44 of a system operator proper, and it transmits to a viewer through a network or an electric wave from the transmitting section 46. In this case, since the compression parameter information 47, such as a transfer rate after the original MPEG bit reduction, is sent to the MPEG encoder 43 from the MPEG decoder 33, compression efficiency can be gathered even if it is real-time encoding. Moreover, by making the watermark section 34 bypass, since voice and the compression sound signal 48 will not be elongated and compressed, audio degradation of them is lost. Here, in not transmitting a compression signal, the image output signal 49 is scrambled as it is, and it transmits from transmitting section 46a. Moreover, in the show system in the aircraft, a scramble becomes unnecessary. Thus, the video signal containing a watermark is transmitted from a disk 11.

[0121] With the equipment of drawing 22 , when a dishonest businessman extracts the signal between each block from an intermediate bus, the watermark section 34 may be bypassed and a video signal may be taken out. In order to prevent this, the bus between a descrambler 31 and the MPEG decoder 33 is enciphered by the handshake method by mutual recognition section 32a, mutual recognition section 32b and mutual recognition section 32c, and 32d of mutual recognition sections. while receiving the code signal which enciphered the signal by mutual recognition section 32c of a transmitting side in 32d of mutual recognition sections of a receiving side -- mutual recognition section 32c and 32d of mutual recognition sections -- mutual -- communication -- that is, a handshake is carried out. As for 32d of mutual recognition sections of a receiving side, this result cancels a code only to a right case. The same is said of the case of mutual recognition

section 32a and mutual recognition section 32b. Thus, by this method, since a code is not canceled unless it is attested mutually, even if it extracts a digital signal from an intermediate bus, a code is not canceled and cannot bypass the watermark section 34 eventually. For this reason, unjust abatement and an unjust alteration of a watermark can be prevented.

[0122] Here, the production approach of the signal 38 about ID information is explained. A signature is collated with the public key with which the BCA data reproduced by the BCA playback section 39 from BCA disk 11a were sent from IC card 41 etc. in the digital signature collating section 40. In the case of NG, actuation stops. Since data are not altered in O.K., ID is sent to watermark data origination section 41a as it is. It is made to generate here using the enciphered information signal which is included in BCA data as a signal of the watermark corresponding to ID signal shown in (3) of drawing 23 . Since this postscript information is not outputted out of a drive with a record regenerative apparatus with a deer, processing of a signal and an alteration cannot be performed. In addition, an operation may be performed from the card ID of ID data or IC card 41 also here, and the signal of a private key may be generated.

[0123] As shown in drawing 24 , when an illegal copy is carried out by the user side, with VTR55, it is recorded on a video tape 56, the video tape 56 on which the illegal copy of the large quantity was carried out appears on the market at a world, and, as for video-signal 49a, it infringes on a copyright person's access. However, when BCA of this invention is used, the watermark on which video-signal 49b (refer to drawing 25) reproduced by video-signal 49a from the video tape 56 was also overlapped sticks. Since it is added in frequency space, a watermark cannot be erased easily. It does not disappear, even if it lets the usual record regeneration system pass.

[0124] Here, the detection approach of a watermark is explained using drawing 25 . The media 56 by which the illegal copy was carried out, such as a video tape and a DVD laser disk, are reproduced by regenerative-apparatus 55a, such as VTR and a DVD player, reproduced video-signal 49b is inputted into the 1st input section 58 of watermark detection equipment 57, and the 1st spectrum 60 which is the spectrum of the signal by which the illegal copy was carried out as shown in (7) of drawing 23 by 1st frequency-conversion section 59a, such as FFT and DCT, is obtained. On the other hand, the original original copy contents 61 are inputted into 2nd input section 58a, it is changed into a frequency shaft by 2nd frequency-conversion section 59a, and 2nd spectrum 35a is obtained. This spectrum becomes as shown in (2) of drawing 23 . the difference of the 1st spectrum 60 and 2nd spectrum 35a -- difference -- if it takes with a vessel 62 -- the difference of drawing 23 as shown in (8) -- the spectrum signal 63 is acquired. this difference -- the spectrum signal 63 is made to input into the ID detecting element 64 spectrum signal 65a based on [in the ID detecting element 64, the watermark parameter 65 of eye ID=n watch is taken out and (step 65) inputted from the ID database 22 (step 65a), and] a watermark parameter, and difference -- the spectrum signal 63 is compared (step 65b). subsequently, the spectrum signal based on a watermark parameter and difference -- it is distinguished whether the spectrum signal 63 is in agreement (step 65c). If both are in agreement, since it turns out that it is the watermark of ID=n, it is judged as ID=n (step 65d). When both are not in agreement, ID is changed into (n+1), the watermark parameter of eye ID= (n+1) watch is taken out from the ID database 22, the same step is repeated, and ID of a watermark is detected. ID of a spectrum corresponds

with a right case, as shown in (3) of drawing 23 , and (8). In this way, ID of a watermark is outputted from the output section 66, and the source of an illegal copy becomes clear. Since the source of a pirate edition disk or the contents of an illegal copy can be pursued by specifying ID of a watermark as mentioned above, copyright is protected. In addition, although this operation gestalt explained using the watermark section of a spectrum diffusion method, the same effectiveness is acquired even if it uses other watermark methods.

[0125] In RAM disk 140a like the DVD-RAM disk 300 or a magneto-optic disk 140 In content providers, such as a CATV office with the DVD record regenerative apparatus or magneto-optic-recording regenerative apparatus shown in drawing 7 The ID number which is a unique media ID number in enciphered BCA as one key The enciphered scramble data are sent to another record regenerative apparatus by the side of a user through a communication line from a content provider, and are once recorded on RAM disk 140a of RAM disks, such as a CATV office, or a phase change mold.

[0126] In the case of a simple system, a user's record regenerative apparatus may perform encryption, i.e., a scramble. It explains, although a part of this structure is overlapped. In this case, in the record regenerative apparatus of drawing 7 , each actuation is carried out according to the protection-of-copyrights level of an input signal. There are three kinds of identifiers of a copy free-lancer, copy WANSU which permits an one-generation copy, and the NEBA copy of the prohibition on a copy in protection-of-copyrights level, and the input signal is overlapped on these identifiers by data or the water mark. By detecting the watermark of an input signal in the watermark playback section 263, three kinds of identifiers are discriminable. First, in the case of a copy free-lancer, it records without applying a scramble, and in a NEBA copy, the record prevention section 265 operates and record is stopped. The unique disk ID is read out of BCA, and in copy WANSU, it is this disk ID, and after scrambling an input signal, it records it on a RAM disk. It explains in detail below.

[0127] First, BCA data are reproduced with the optical head 29 from disk 140a, such as a phase change mold RAM disk of DVD-RAM, and an optical MAG mold RAM disk, BCA is reproduced and BCA data are outputted by PE-RZ recovery section 350a and ECC decoder 530b from the BCA output section 550. Into 188 bytes of BCA data, 64-bit (8 bytes) record of the unique disk ID is carried out, for example, and this disk ID is outputted.

[0128] When recording the input signal of copy WANSU, an MPEG video signal is scrambled in the scramble section 271 in a record circuit 266, using this disk ID as one of the keys. And the scramble-ized image data are made into a record signal by the Records Department 272 including a record circuit, and it is recorded on RAM disk 140a by the optical head 29.

[0129] Since it is the operation of normal when reproducing this scramble signal, as shown in drawing 7 , a private key is produced from the enciphered BCA data which were able to obtain BCA from reading and the BCA output section 550, and a scramble is canceled by descrambling section, i.e., code decoder, 534a, using the unique disk ID or private key in BCA data as one key. And an MPEG signal is elongated by the MPEG decoder 261, and a video signal is acquired. However, since the BCA data of a disk differ when the scramble data recorded on RAM disk 140a produced with the operation of normal are copied to another RAM disk 140b (i.e., when it is used unjustly), and it

reproduces, the right key for undoing scramble data is not obtained, and a scramble is not correctly canceled by code decoder 534a. For this reason, a video signal is not outputted. Thus, since the signal unjustly copied to RAM disk 140b of the second generation after the 2nd sheet is not reproduced, the copyright of the contents to which the watermark of copy WANSU was added is protected. As a result, contents cannot carry out record playback only at RAM disk of one sheet 140a. Record playback can be carried out only at the DVD-RAM disk of one sheet similarly [in the case of the DVD-RAM disk 300 shown in (a) of drawing 15 , and (c)]. Since the BCA signal enciphered by furthermore enciphering BCA is not outputted from a record regenerative apparatus, can output only BCA data, they cannot be taken out, and the above-mentioned private key cannot be decoded or changed, and it cannot create in addition, either.

[0130] In protecting software furthermore strengthened, it sends the BCA data of RAM disk 140a by the side of a user to a content provider side through a communication line first. Next, in a content provider side, at the watermark Records Department 264, a video signal is embedded as a watermark, and this BCA data is transmitted. In a user side, this signal is recorded on RAM disk 140a. At the time of playback, in the watermark playback collating section 262, a record authorization identifier, and the BCA data of a watermark etc. and the BCA data obtained from the BCA output section 550 are collated, and only when in agreement, decode playback is permitted. Thereby, protection of copyright becomes still stronger. By this approach, since a watermark is detectable with the watermark playback section 263 even if digital one / analog copy is carried out from RAM disk140a at a direct VTR tape, a digital illegal copy can be prevented or detected. Prevention or detection of a digital illegal copy can be performed similarly [in DVD-RAM disk 300a shown in drawing 7].

[0131] Here, protection of software is strengthened more by forming the watermark playback section 263 in a magneto-optic-recording regenerative apparatus or a DVD record regenerative apparatus, and adding the enciphered information which shows "a 1-time recordable identifier" to the signal received from the content provider. It will be prevented by the record prevention section 265 and "the identifier recorded [1 time]" if record carries out for granting a permission by the record prevention section 265 at this time, the 2nd record, i.e., illegal copy, to a disk.

[0132] Moreover, by the watermark Records Department 264, as a watermark, the individual disk number of the identifier which shows "finishing [1 time record]", and RAM disk 140a beforehand recorded on the BCA Records Department 120 can be further superimposed on a record signal, can be embedded to it, and can also be recorded on RAM disk 140a.

[0133] Furthermore, it is also possible to use the signal which gives the key to which the day entry permitted by system operators, such as a rental agency, was added from the hour entry input section 269 to a watermark and the key of a scramble in the scramble section 271 as postscript information, or is compounded in a password. If playback collating of the day entry is carried out by the regenerative-apparatus side using a password, BCA data, or a watermark at this time, in code decoder 534a, it is also possible to restrict the period of a scramble key which can be canceled, for example like "being usable for three days." Since it is the postscript information which is not outputted from a regenerative apparatus, it can also be used for a rental disc system including such a hour entry. Also in this case, a copy is prevented further, protection of copyrights is powerful

and an unauthorized use becomes very difficult.
[0134] Moreover, as shown in the record circuit 266 of drawing 7 , both sides are checked in the watermark playback section 263 of a regenerative apparatus by using BCA data for a part of cryptographic key of a scramble, and using BCA data for the primary enciphered postscript information and the secondary enciphered postscript information. An illegal copy can be prevented thereby still more powerfully.
[0135] As described above, even if it is a rewritable optical disk like the magneto-optic disk used for ASMO, or DVD-RAM, the protection of copyrights using a watermark or a scramble is strengthened more by using the proper information which cannot output the postscript information on this invention.
[0136] Moreover, the postscript information in the gestalt of the above-mentioned implementation can perform a format of an information signal etc. in common with a DVD disk and a magneto-optic disk. For this reason, with the playback procedure of postscript information as shown in the flow chart of drawing 10 and drawing 11 , if it is the optical disk which is compatible with the same record regenerative apparatus of a configuration, with regards to that class, protection of contents and management can be performed in common [there is nothing and]. Therefore, a reliable optical disk and its record regenerative apparatus are realizable.
[0137] Moreover, if the method of payment of the charge of utilization from an IC card etc. is combined with transmission of the postscript information to which the output for every software to be used or contents was forbidden, and offer of the information about the private key from a content provider, it will become realizable [the pay-per-view of image information etc. / the accounting system for every contents]. Furthermore, setting out for every optical disk is attained also about the accounting approach for utilization of contents using the postscript information to which the output was forbidden.
[0138] Furthermore, in a write once optical disk including the postscript information to which the output was forbidden or a rewriting mold optical disk, and a record regenerative apparatus, if personnel's individual information is added as a system used in the data file of the information on individual management, or an enterprise and it enciphers, it will become possible to setting out of the access privilege for every optical disk used for the data file of the information in personal data or an enterprise. Especially access from the outside to the data file by which the security of information protected in addition to the specific user, such as information about individual privacy, is able to realize the system strengthened more, was protected in this way, and protection management was carried out becomes very difficult.
[0139] Furthermore, if the same signal as a ROM disk or a RAM disk is superimposed and recorded on a video signal by the system which combined the BCA information enciphered in the postscript information on this invention, and a private key, an imagination watermark can be realized and the watermark equivalent to ID information which the content provider published altogether will be embedded by using the optical disk and regenerative apparatus of this invention as this result at the video signal outputted from a regenerative apparatus. Compared with the approach of managing a video signal for every conventional disk, the costs and the production times of a disk are substantially reducible.
[0140] Moreover, in the gestalt of the above-mentioned implementation, it explained using the ROM disk of DVD of a two-sheet bonding type, the RAM disk, or the optical

disk of veneer structure. However, according to this invention, it cannot be based on the configuration of a disk but the same effectiveness can be acquired over a disk at large. That is, it also sets to other ROM disks, a RAM disk or a DVD-R disk, and a magneto-optic disk, The explanation is omitted, although the same effectiveness is acquired even if it reads each explanation as a DVD-R disk, a DVD-RAM disk, and a magneto-optic disk.
[0141] In the gestalt of the above-mentioned implementation, the magneto-optic disk with which a recording layer consists of a three-tiered structure of a CAD method was mentioned as the example, and was explained. However, you may be the magneto-optic disk in which magnetic super resolution playback of an FAD method, a RAD method, or a double mask method is possible, the conventional magneto-optic disk, or the magneto-optic disk of the method which expands a record magnetic domain and is reproduced. Moreover, with the above-mentioned disk configuration and above-mentioned play back system of postscript information, even if it is the conventional optical disk, DVD-ROM, DVD-RAM, DVD-R, and the configuration that reads the information on the recording layer more than two-layer from one side further for densification, since the management information of the software of an optical disk is easily recordable on postscript information, the outstanding optical disk which can prevent the duplicate of contents can be offered.
[0142] Moreover, although the gestalt of operation of this invention explained the optical disk, it can develop also to the magnetic tape and the optical tape which are other record media, a magnetic disk and an optical card, a magnetic card, and semiconductor memory equipment, and it is obvious that it is the range of this invention.
[0143]
[Effect of the Invention] As explained above, according to this invention, by the configuration using the postscript information on an optical disk, and the above-mentioned simple approach, protection management of the copyright of software can be performed easily and becomes possible [realizing a preventive measure] about the very powerful duplicate of contents.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The flat-surface block diagram of an optical disk and the record playback wave form chart of a signal in the gestalt of operation of this invention
[Drawing 2] Drawing showing the physical format of optical disk postscript information
[Drawing 3] The sectional view and the signal regeneration wave form chart of postscript information showing the configuration of the magneto-optic disk in the gestalt of one operation of this invention
[Drawing 4] The top view and sectional view showing the configuration of the magneto-optic disk using magnetic super resolution
[Drawing 5] The block diagram showing the recording apparatus of postscript information, and the perspective view of the laser section of the recording apparatus of postscript information
[Drawing 6] Property drawing showing the car hysteresis loop in a direction vertical to

the film surface of the BCA section by which the recording layer of a magneto-optic disk is heat-treated, and the non-BCA section which is not heat-treated
[Drawing 7] The block diagram of the record regenerative apparatus of an optical disk (a magneto-optic disk, DVD-ROM, DVD-RAM, DVD-R disk)
[Drawing 8] Drawing of the optical configuration of the record regenerative apparatus of a magneto-optic disk
[Drawing 9] Traced drawing showing the differential signal wave of the BCA signal at the time of record current 8A of a magneto-optic disk, and traced drawing showing the addition signal wave form
[Drawing 10] A part of flow chart which shows the procedure which reproduces postscript information including the signal to which the output of an optical disk should be forbidden
[Drawing 11] A part of flow chart which shows the procedure which reproduces postscript information including the signal to which the output of an optical disk should be forbidden
[Drawing 12] The block diagram of the system which consists of an optical disk record regenerative apparatus and a personal computer.
[Drawing 13] The flow chart of the playback approach of the MBCA signal which is the postscript information in an optical disk
[Drawing 14] The flow chart of recovery actuation with an optical disk record regenerative apparatus
[Drawing 15] The sectional view and the signal regeneration wave form chart of postscript information showing the configuration of the optical disk in the gestalt of operation of the 2nd of this invention
[Drawing 16] The block diagram of the regenerative circuit of BCA
[Drawing 17] The wave form chart of the signal for explaining BCA playback
[Drawing 18] The graph of a modulation noise when recording BCA on the DVD-RAM disk of a phase change mold
[Drawing 19] The block diagram of the disk manufacture department in the manufacturing installation of an optical disk
[Drawing 20] The block diagram of content provider's disk manufacturing installation and a system operator's regenerative apparatus
[Drawing 21] The block diagram of the record regenerative apparatus of an optical disk
[Drawing 22] The block diagram of the whole retransmission-of-message equipment by the side of a system operator, and a regenerative apparatus
[Drawing 23] Drawing showing the wave on the time-axis of the HARASHIN number and each video signal, and the wave on a frequency shaft
[Drawing 24] The receiver by the side of a user, and the block diagram of the retransmission-of-message equipment by the side of a system operator
[Drawing 25] The block diagram of the watermark detection equipment of an optical disk
[Description of Notations]
3 Contents
4 MPEG Encoder
5 Original Recording Creation Machine
6 Original Recording
7 Making Machine

8 Substrate
9 Lamination Machine
10 Lamination Disk
11 BCA Disk
12 Identification Code (ID Information)
13 BCA Recorder
14 Code Encoder
15 Reflecting Layer, Protection Stratification Machine
17 Motor
19 Disk Manufacture Department
20 Cryptographic Key
21 Disk Manufacturing Installation
22 ID Database
23 System Operator
25 Regenerative Apparatus
26 ID Generating Section
27 Watermark Creation Parameter Generating Section
28 Retransmission-of-Message Equipment
29 Optical Head
30 Data Playback Section
31 Descrambler
32 Mutual Recognition Section
33 MPEG Decoder
34 Watermark Section
34a Frequency-conversion section
35 Frequency Spectrum
36 Spectrum Mixing Section
37 Reverse Frequency-Conversion Section
38 ID Signal
39 BCA Playback Section
40 Digital Signature Collating Section
41 IC Card
42 Output Section
43 MPEG Encoder
44 Cryptographic Key
45 2nd Scrambler
46 Transmitting Section
49 Video Signal (Watermark is Entered)
50 Receiver
51 2nd Descrambler
52 MPEG Decoder
53 Output Section
54 Monitor
55 VTR
56 Record Medium
57 Watermark Detection Equipment

58 1st Input Section
59 1st Frequency-Conversion Section
60 1st Spectrum
61 Original Copy Contents
62 Difference -- Vessel
63 Difference -- Spectrum Signal
64 ID Detecting Element
100 Optical Disk
101 Postscript Information
103 CDC of the Main Information
104 Stripe Existence Identifier
105 Postscript Stripe Data Existence Identifier
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107 2nd Postscript Information
108 Stripe Null Section
110 The Main Information
111 MBCA CDC
112 MBCA Information against Output
113 Refreshable MBCA Information
120a, 120b The BCA section
120c, 120d The non-BCA section
129a An optical spot
129b The low-temperature part in an optical spot
129c The elevated-temperature part in an optical spot
130 Record Domain
131 Disk Substrate
132 Dielectric Layer
133 Playback Magnetic Film
134 Medium Cutoff Film
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136 Medium Dielectric Layer
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310a, 310b The BCA section
310c, 310d The non-BCA section
311 Disk Substrate
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408 Serial Number Generating Section
409 Input Section
410 PE-RZ Modulation Section
411 Laser Luminescence Circuit
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415 Motor
416 Live Center
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420 1st Time Slot
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429 Laser Power Circuit
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